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Enterprise's process innovations in the context of enterprise's financial performance

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Abstract
Enterprise process management is one of the most important components of enterprise management. It is necessary to know, optimize and innovate the ongoing processes in the enterprise in order to efficiently meet the established results of the enterprise in order to enhance the efficiency of the enterprise's processes themselves and satisfy the customers' requirements in the context of the financial performance enhancement and competitiveness of the enterprise. The enterprise's financial performance is measured as the rate of achievement of the enterprise's financial performance by comparing actual and established results. In assessing the performance of ongoing processes in the enterprise, it is necessary to establish procedures that provide objective information on ongoing processes in the enterprise. The aim of the paper is to analyze enterprise's process innovations in the context of enterprise's financial performance enhancement and to assess opportunities to develop these processes as fundamental aspects of measurement and enhancement of the enterprise's financial performance. The result of the research is that the implementation of enterprise's process innovations has a significant impact on enhancing the enterprise's financial performance, assuming optimal control and coordination of all ongoing activities in the innovation process.

Keywords
Innovation, Process Innovation, Financial Performance, Enterprise.

Introduction

Nowadays, the foundation of the enterprise's success is to move from a functional organization to a process organization. Processes are an essential part of the enterprise as well as the whole society. Every enterprise wants to meet its aims, and this is not possible without knowing the processes. It means adapting enterprise's processes to meet customer requirements while eliminating redundancies and deficiencies from enterprise's processes. Process management is one of the most important parts of enterprise's management. In the knowledge-based economy, innovation is at the forefront, virtually ubiquitous, and applies to all areas of the enterprise. Innovation becomes the philosophy of the future. Innovation is the ability to come up with new, innovative ideas, combining or combining them in a unique way. Innovation in the enterprise's supports the preconditions for new practices and solutions (Lesáková, 2008). Innovative processes bring enterprise's success. They are a decisive tool for economic development of the enterprise. An important factor in the enterprise's innovation is high performance, flexibility and the development of innovation potential (Dugas & Ferencz, 2015). We distinguish innovation management from innovative management. Innovative management refers to the management of which the adoption of innovation, the promotion of new, creative solutions is the basis of management methods and techniques. It assumes the creativity of human resources in the enterprise, the introduction of new, radical methods and techniques of human development, the introduction of knowledge management, as well as pro-innovation behavior. The innovative approach of the enterprise's results in an improved

and changed new solution. We know innovation management as a separate management discipline, which deals with the methods and techniques of managing the innovation process in the enterprise, up to their successful implementation on the market. Innovation management is a comprehensive management tool for effective innovation management (Lesáková, 2008). Innovation Management is a new management discipline that deals with identifying, analyzing and managing the entire innovation process (Dugas & Ferencz, 2015). Enterprises are going through different changes and managers need to be ready. Changes are seen by enterprise's managers as opportunities or perceived as threats (Drucker, 2007). Schumpeter & Swedberg (1989) has characterized 5 specific changes that evolve introducing new products or original products with new features, opening new markets, changes in production organization and security, the use of new production techniques, production processes or new commercial production security, and the use of new raw materials or semi-finished products. The enterprise that seeks to maintain and consolidate its market position must pursue an innovative policy that will enable it to achieve a competitive position and competitive advantage (Synek, 1996).

The aim of the paper is to analyze enterprise's process innovations in the context of enterprise's financial performance enhancement and to assess opportunities to develop these processes as fundamental aspects of measurement and enhancement of the enterprise's financial performance.

1. Literature review

The founder of the theory of innovation is Joseph Schumpeter, who in 1911 formulated the "Combinations of developmental changes", understood as overcoming the restoration of systems and processes in a closed circle (Schumpeter & Swedberg, 1989). He focused on analyzing the enterprises' conditions under which an enterprise is interested or can make new combinations of developmental changes. He understood innovation as the application of these changes in the enterprise's practical activities. Innovation is the most important factor determining enterprise's success. With increasing globalization and increased competition, they are becoming increasingly important. Innovation must combine business, marketing, development, production, resource and enterprises' processes. Their success is not based on the random search for "miraculous" solutions, but is based on the knowledge of the system, psychology, philosophy and innovation economy (Kislingerová, 2008). According to Drucker (2007), innovation is a specific tool for entrepreneurs to use change as an opportunity to differentiate their entrepreneurship. Freeman (2008) describes innovation as the design, producing, technical, marketing and management activities associated with launching a new product or first commercially using a new process or device. Innovation comes from the Latin word "Innovare" that means renewing, changing, making new. We define the nature of innovation as a process from creating an idea to accepting change, radical change, creating an invention or something new to the whole of society. Overall, innovation is a purposeful, dynamic process that results in a positive change aimed at improving the enterprise's reproduction process and greater customer satisfaction (Čimo & Mariaš, 2006). There is no need to look only for technical breakthroughs under innovation. Technical changes to the product and technological lead in production may not be successful. Many enterprises have perfect products made by professional technology, but customers are not interested. What distinguishes innovation from normal conversion is creating value for the customer. Innovation brings value to the customer in the form of simplicity, reduced risk, increased comfort, convenience, benefit of entertainment, price, image, fashion, emotion or environmental friendliness (Kislingerová, 2008). Changes in decisions may not always produce a positive result, but the rigid behavior of the enterprise certainly does not contribute to its growth. Enterprises consider sustainable production as a means of creating innovation, considering environmental, economic, and social considerations (Germani, Luzi, Marilungo, Papetti, & Peruzzini, 2016). Only enterprise that knows its customers well can understand their needs, requirements and motives. Given that customers and competitors are constantly moving, success can only be achieved by the enterprise that understands this move and can create a new, customized offer accordingly (Kislingerová, 2008). Innovation is a strategy-oriented change that brings benefits to customers and a blue ocean enterprise (Chan Kim & Mauborgne, 2015).

Innovation promotes creativity and invention. The main reason for innovation is usually a group of customers, or research results that lead to the innovations of product, innovations of processes,

innovation of enterprise's system, and innovation of enterprise. Innovation also includes modernization. Enterprise's innovations have two forms, such as process innovations that deal with streamlining technological processes, and product innovations that deal with creating completely new products or increasing the economic and technical parameters of current products. Innovations in the launch of new products on the market can bring many benefits to the enterprise, such as gaining a positive image in the eyes of the public, obtaining a favorable position on the market early, choosing distribution channels, gaining quickly through low production costs (Synek, 1996). Innovation can relate to products, means of production, technology, organizational structure of the enterprise, qualification and professional structure of the workforce. These can be both quantitative and qualitative changes, changes with both positive and negative socio-economic consequences (Čimo & Mariaš, 2006). Enterprises can support the competitiveness of the products capabilities to develop organizational strategies that support technological innovation (Liu & Jiang, 2016). Kislingerová (2008) distinguishes these types of innovations:

- Product innovations that introducing new or significantly improved products or services, for example significant improvement in technical parameters, significant changes in product and service capabilities. These innovations lead to the launch of a brand-new product or service or to a significant improvement of an existing product.
- Process innovation such as changes in production and supply methods, introduction of new or significantly improved production or delivery methods, for example significant changes in technology, equipment, or software.
- Marketing innovations that introducing a new marketing method and includes significant changes in product design or packaging, product placement, product support, or awards. These innovations can include changes in the marketing mix, product design, packaging, product promotion and placement, as well as changes in pricing and service methods.
- Organizational innovation that introducing a new organizational method in enterprise's practices, in a job organization or in external relationships.

According to (Kislingerová, 2008) innovations offer some benefits. An enterprise coming first has the chance of high profits, if it comes with groundbreaking technology, it can destroy the benefits of another enterprise. Innovation should be considered comprehensively. Technologies are not the only form of innovation, new ways of doing business can be a major innovation. They can become an important competitive advantage, not easily replicable. The inclination to innovate - employees, managers, owners of small and medium-sized enterprises tend to be more innovative and bolder than in large enterprises. In fact, many small and medium-sized enterprises arise because the former employees of large corporations were not satisfied to push for innovation. Successful innovation is conditional on a comprehensive approach; it must note a whole range of enterprise's activities such as purchasing, management, marketing, technology, organization, service and sales. The focus must be on customer management and implementation. In the last stage, it must derive the appropriate effect from innovation. Customer decides on success, respectively failure of some innovation.

The term process refers to any activity in which inputs arrive and is output in a certain way. In a simple sense, it means transforming inputs into outputs. Often the output from one process directly enters the next following process (Borovský, 2005). A process is a group of activities and activities that are interconnected, require one or more inputs, and produce an output that has value for the customer in the form of a product or service. In addition to inputs, the process enters resources such as human (workers) and physical (machines, equipment, tools, auxiliary materials, etc.). Each process has its internal and external limitations. The process is defined as interconnected activities that transform inputs into outputs in their sequence. It means a summary of activities that require one or more types of inputs and produces an output that is worth the customer. The aim of the process is to create a performance that is required by an internal or external customer (Papulová, Papula, & Oborilová, 2014). There are main processes (key, implementation, value-creating), supporting processes (provisioning, support) and managerial processes.

The main processes affect the product of the enterprise, they are directly involved in the creation of value, they are the most perceived by the customer. They are key to the enterprise, fulfill mission and answer basic existential questions.

Supporting processes are activities necessary for the operation of the main processes, but do not create value from the perspective of the customer. They are indirectly involved in creating value for the customer. They indirectly support the fulfillment of the enterprise's basic mission. These include purchase, maintenance, energy supply, warehouse management, etc. Management processes manage and coordinate core and support processes as well as the entire enterprise (Papulová et al., 2014). A process approach involves the systematic identification and quality management of processes used in the enterprise and the interconnection between these processes. Nowadays, the strategic aim of any enterprise must be to achieve continuous process improvement in order to improve process performance (Cokins, 2004). Every enterprise seeks to create the best possible conditions for innovation. This is possible with two options. The enterprise can actively support innovations and not to create barriers to innovation (Čimo & Mariaš, 2006). Innovation process is called preparation and gradual implementation of innovation changes. The innovation process results in innovation as a positive change that is being implemented and used. The task of the innovation process is to purposefully and planned influence the reproduction of the enterprise in accordance with the growing needs of the customer as well as the market as an overall system. Innovation processes in entrepreneurial activities are understood to mean the realization of certain innovations or summaries thereof, which ensure quantitative and qualitative transformation in products, processes and structure of production-technical substance with economic and social contexts (Čimo & Mariaš, 2006). The innovation process is comprised of parts that are referred to as the stages of the innovation process. Typically, there are 5 phases of the innovation process such as science, development, research, production and use. Science includes knowledge of basic research, elaboration of theoretical approaches to solving the problem. Development includes product and thought input, product development and engineering, product design, testing and eventual product modification. Research includes applied theoretical and experimental research, and verification. Production includes production preparation, production introduction, production management, product launch and subsequent shipping. The exploitation phase includes customer service, service provision and operations as well as disposal of obsolete production, where new innovative production has been introduced. The innovation process only goes through all these stages in the case of major innovation changes. In partial innovation, it is shortened to phases that are necessary and important to ensure concrete and real innovation (Čimo & Mariaš, 2006).

Enterprise's performance measurement can be determined using both financial and non-financial indicators. It considers financial indicators to be a traditional way of measuring performance. Non-financial indicators include, for example, the quality of human resources, the ability to acquire and retain customers, the quality of management. It is recommend combining traditional methods (using financial indicators) with non-financial indicators (Papulová et al., 2014). Financial performance indicators include liquidity indicators, profitability indicators, activity indicators, and indebtedness indicators (Zalai, 2016).

Process performance is a measure of achievement of desired process results, the size of which is determined by the difference between actual and desired results. The task of measuring the performance of enterprise's processes is to identify procedures that will generate objective information about the processes used in different situations and problems. It is a systematic assignment of numerical values to the appropriate sets. Measuring enterprise's process performance is a separate process of measuring work and its outputs. When measuring, it is necessary to determine the objective performance status in a chosen way or method in order to quantify the values of defined enterprise's process performance indicators. This is an opportunity for the enterprise to improve the performance of enterprise's processes. Performance, quality, and productivity are related to process performance. Quality reflects the level of ability to meet customer requirements. Productivity reflects the need for efficient use of resources. Quality and productivity directly affect performance. The relationship between these three terms is directly proportional. Improving performance will lead to increased productivity and quality improvement. Data from process performance measurements can be used to control processes. We determine performance based on production process performance indicators. Selected performance indicators of production processes include worker productivity, overall equipment efficiency, machine and process capability indexes, the proportion of non-

conforming products to outputs, and average profit per worker (Papulová et al., 2014). Worker productivity such as performance indicator of production processes are treated in a similar way by authors Sponte Pistalu (2018) and Nica (2018). The current trend is the expansion of digitally mediated labor in technology (Mitea & Raluca, 2018). Automated environments and breakthroughs in artificial intelligence bring about innovative kinds of skills and employment disruptions (Nica, Manole & Stan, 2018).

2. Data and methodology

The object of the research is the selected Slovak producing enterprise, the predominant activity of which is development, production, recycling and application of structural plastics. It offers comprehensive plastic compounding and recycling services, including technical support. It also offers laboratory services externally. The enterprise's products are widely used in the automotive, electrical and consumer industries due to their quality and flexibility. Quality is an essential feature that enterprises' partners expect from enterprises' products. However, the enterprise offers its customers more such as care, technical service and advice that enterprises' partners get along with quality injection materials. The enterprise's know-how and flexibility make it possible to offer tailor-made products according to customer requirements and offer application technical support. It holds the following certificates: Quality Management System according to EN ISO 9001:2008, ISO/TS 16949:2009 and Environmental Management System ISO 14001:2004. The vision of the enterprise is to be a reliable, quality, flexible, stable manufacturer of structural plastics and an innovative partner for manufacturers of technical plastic moldings in Slovakia and Central Europe. The mission is to provide a comprehensive solution in the development, manufacture and supply of structural plastic for injection molding and recycling of plastic waste in collaboration with customers. It consists of headquarters and three production facilities. The headquarters is an economic, commercial, marketing and personnel center, which ensures the purchase and sale of raw materials for all production facilities. It offers technical support and services at various levels of cooperation before, during and after product delivery to customers. These services include advice and technical service from material development to production execution, comparison of equivalents, development of universal material for multiple application and technical participation in material testing. The first production facility is specialized in compounding. It has modern compounding lines to produce structural plastics for thermoplastic injection molding. The result of compounding is to create a construction plastic with the characteristics the customer requires. It produces premium plastic or recycled material, which is filled with various additives. The additives may be for example glass fiber, talc or any substance needed to achieve the properties that the customer needs. By adding these substances, the properties of the product are changed, for example the color shade is changed, the product becomes non-flammable, heat resistant, UV resistant. Thus, the customer's requirements for the product's characteristics are met. It is the largest production center, with the highest yields. Four production lines can produce 500 tons of structural plastics per month. In addition to the production of structural plastics for injection, a laboratory has been established here. For continuous product quality assurance and enhancement, it is equipped with a large testing laboratory where various types of tests are performed (physical and mechanical properties of plastics tested). The testing laboratory meets the requirements of STN EN ISO/IEC 17025:2005 and the laboratory management system meets ISO 9001:2008. The first production facility is trying to create the most suitable product directly for injection, which will be used in the second production facility. Ready-made plastic moldings are produced in the second production facility. Production in this production facility is measured in number of pieces. It has resources for injection molding. It can meet the stringent requirements of products designed especially for the automotive industry. The paper analyzes the third production facility. In the field of plastic recycling, the third production facility provides complete outsourcing of plastic waste management, thereby increasing its competitiveness and, at the same time, contributing to environmental protection. Recycled plastics are return through the regranulation process. Unusable plastic waste is purchased. It delivers the products of this facility in-house or even direct sales. The third production facility processes plastic waste, from which it produces recycles in the form of granulate. The input material for the production process is plastic waste of fibrous character, thick-walled or thin-walled plastics. The material is imported from various Slovak suppliers that

produce plastic waste and from suppliers from abroad. The manufacturing plant buys plastic waste such as fiber, thick-walled or thin-walled plastics. These inputs must first pass through the mills (crushers). The feed material is crushed to the desired fraction to allow its regranulation. The material thus prepared is suitable for regranulation on a regranulation line. The thermal process melts the plastic waste, filters out the impurities, and is extruded into strips in the form of strings, where the strings are cooled and passed to the granulator. In the granulator, the chilled plastic strings are cut to degranulate. The resulting plastic degranulate forms the final product of the enterprise, that, after drying in the drying silo, is most often packaged in large bags of so-called big bags weighing 1000 kg. In one day, the enterprise produces on average 3 to 3.5 big degranulate bags. The products (outputs) are used as structural plastics for injection molding of technical moldings with wide use in automotive, engineering, electrical and consumer industries. The manufacturing process consists of the receipt of material for storage, unloading of waste material, raw material input control crushing, milling of material to three kinds of mills according to the nature of the input material, transfer of crushed raw materials to the workplace of regranulation and regranulation itself, drying, packaging and weighing of the granulate, storage of finished products, the transfer of waste from workplaces to a waste warehouse, and moving finished products from stock to finished product loading area. Threads in the main production are process procurement, product development, processing orders, distribution, and customer support.

The subject of the paper is to assess the impact of process innovations on enterprise's financial performance enhancement, pointing to the necessity of implementing process innovations as fundamental aspects of measurement and enhancement of the enterprise's financial performance. Several methods of exploration were used in the paper, where epistemology was applied as a basic method of research. Standard methods of research, such as observation, synthesis, analysis, analogy, deduction, classification, and comparison presenting basic methodical approach to paper processing are applied. The knowledge gained using these research methods has created a new, higher level of knowledge of research problems. Ways of understanding and explaining impact of process innovations on enterprise's financial performance, the inductive-deductive and analytic-synthetic logical scientific methods are used. Finally, the implementation of enterprise's process innovations has a significant impact on enhancing the enterprise's financial performance, assuming optimal control and coordination of all ongoing activities in the innovation process.

3. Results and discussion

Production potential needs to be revealed to boost enterprise's performance. Potentials may relate, for example, to materials, processes, people, manufacturing errors, logistics, etc. We must identify the areas that will be affected by performance improvements. Increasing production performance means defining methods in three basic areas such as trial, workers and devices. The enterprise needs to know the processes thoroughly, but especially to deal with standardization and process quality. This is the key to success. Human capital is an important resource in the production process. Increasing the enterprise's performance is also dependent on employee performance. We see the greatest potential in improving performance in devices. Quality equipment of the enterprises guarantees the production of quality products and reduction of error products. Selected enterprise must monitor its performance. We will measure enterprise's performance through financial ratios and process performance indicators. We will evaluate the indicators of liquidity, activity, profitability and indebtedness of the enterprise for the period 2014-2018. We will quantify the financial indicators based on the data from the enterprise's financial statements.

Enterprise's liquidity analysis is seen as one of the most important areas, as it can draw attention to unfavorable conditions that may occur. The enterprise that achieves optimal liquidity indicators is one that can properly settle its liabilities. Liquidity ratios reflect the degree of coverage of short-term foreign funds by liquid assets. We distinguish three levels of liquidity, namely quick liquidity (recommended value 0.2-0.6), current liquidity (recommended value 1.0-1.5) and total liquidity (recommended value 2.0-2.5). We calculate the liquidity financial indicators as a ratio of current assets to liquidity and short-term liabilities. The higher the value of these indicators, the higher the probability of maintaining the enterprise's solvency. Although the values of indicators are not recommended in the literature, we evaluate the liquidity positively. The indicators have a positive trend over the last 5 years and are close to the recommended values. Based on the

overall liquidity indicators, we can say that the enterprise is liquid, its current assets exceed the value of liabilities. Upon monetization, the enterprise can meet its short-term liabilities. In 2018, the value of current assets exceeded short-term liabilities by more than 60%. Although the balance on financial accounts is not enough to cover short-term liabilities, we may consider the enterprise to be liquid. In 2018, the current liquidity of the enterprise as already reached the recommended value, and thus, after obtaining payment of receivables from customers, the enterprise can fully cover short-term liabilities. We appreciate the increasing trend of indicators and we consider the enterprise to be liquid. The calculated liquidity indicators are shown in Table 1.

Table 1 The liquidity indicators

Indicator/Year	2014	2015	2016	2017	2018
Quick Liquidity	0.09257	0.09485	0.09009	0.09803	0.11618
Current Liquidity	0.75244	0.72316	0.76295	0.89993	1.08238
Total Liquidity	0.37364	1.34605	1.23288	1.44306	1.63246

Source: Own processing based on Enterprise financial statements.

Activity indicators quantify the efficiency of enterprise's management with assets, allow us to analyze how effectively the enterprise uses it. It is a bad situation for the enterprise if has too much of an asset (extra cost, or can be covered by a loan), even a little (for example, in inventory). Typical indicators are inventory turnover time (expresses the ratio of inventories in sales), short-term receivables turnover time (expresses the ratio of receivables in sales), period of repayment of liabilities (expresses the ratio of liabilities in sales), asset turnover time (expresses the ratio of assets in sales) and asset turnover (expresses the ratio of sales in assets). Because the selected enterprise is manufacturing, it is important to monitor the inventory and turnover of inventory. Good inventory turnover has decreased significantly over the past 5 years. While in 2014 the turnover was almost 40 days, it is currently less than 25 days. A downward trend in turnover time is also expected in the future. Low inventory turnover is a sign of production continuity. At the same time, it reflects the proper management of the enterprise because the funds are not tied to inventory. Inventory turnover and the turnover of short-term receivables also decreases. Over the past 5 years, the turnover of receivables has fallen by almost half. At present, the average claim settlement time is less than 3 days. Low average time reflects the quality and stability of customers. Following the receivables turnover period, it is also necessary to assess the repayment period of short-term liabilities, which has been reduced by up to half. Currently, the short-term repayment period is less than 4 days. Based on the trend over the past 5 years, we can assume that it will continue to decline. We appreciate that the value of repayment of short-term liabilities approximates the value of short-term receivables turnover. At the time of collection of short-term receivables, the enterprise can settle its short-term liabilities. This fact improves the enterprise's solvency. The asset turnover period has been decreasing for 5 years and has been shorter than 1 year over the entire period. In 2018, the enterprise was able to reflect the value of its assets in sales for approximately 217 days. We appreciate very positively that the enterprise managed to turn its sales value by 1.66 times in 2018. The calculated activity indicators are shown in Table 2.

Table 2 The activity indicators

Indicator/Year	2014	2015	2016	2017	2018
Inventory Turnover	39.26	31.55	27.54	25.87	24.58
Short-Term Receivables Turnover Time	5.83	3.21	3.37	3.22	2.74
Period of Repayment of Liabilities	9.29	7.02	6.99	5.05	3.68
Asset Turnover Time	320.03	276.76	238.66	267.06	217.43
Asset Turnover	1.12	1.30	1.51	1.35	1.66

Source: Own processing based on Enterprise financial statements.

Profitability indicators expresses the ratio of profit to another value characterizing the enterprise's activity (for example, sales, costs, revenues, total capital, assets, equity). When calculating profitability indicators, we consider profit after tax. The most important indicators include return on sales, cost-effectiveness, return on costs, return on capital, return on assets and return on equity. The enterprise achieves positive economic results. During the reporting period, it achieved a profit in each year. The individual indicators of profitability compare the economic result and express how much of the profit is per individual value analyzed. The most profitable components are revenues and equity. Sales are the least profitable in the enterprise. Based on profitability indicators, we consider the enterprise profitable. The calculated profitability indicators are shown in Table 3.

Table 3 The profitability indicators

Indicator/Year	2014	2015	2016	2017	2018
Return on Sales	25.69%	21.68%	25.97%	26.26%	24.19%
Return on Costs	42.13%	37.58%	45.00%	46.80%	40.92%
Return on Revenues	65.84%	51.23%	61.42%	59.81%	59.18%
Return on Investments	45.50%	31.65%	43.82%	39.50%	44.30%
Return on Assets	41.47%	28.22%	39.34%	35.51%	40.15%
Return on Equity	64.63%	45.30%	55.61%	58.40%	60.27%

Source: Own processing based on Enterprise financial statements.

Indebtedness indicators reflect the extent to which the enterprise is financed from its own and foreign sources. We will ensure the financial stability of the enterprise if we maintain an optimal ratio of assets coverage. In addition to monitoring the structure of financial resources, these indicators also serve to assess the enterprise's ability to repay debts. The selected indebtedness indicators are the degree of self-financing (expresses the ratio of equity in total capital), the degree of indebtedness (expresses the ratio of foreign capital in the total capital), financial leverage (expresses the ratio of assets in equity), coverage of interest (expresses the ratio of pre-tax profit and interest on total capital), interest burden (expresses the ratio of interest on pre-tax profit including interest) and insolvency (expresses the ratio of short-term liabilities on short-term receivables). Based on the indicator of the level of self-financing and the indebtedness indicator of the enterprise, the enterprise finances more than 60% of its assets from its own resources. However, it is positive that the enterprise is not highly indebted, and its interest rate is low. In 2018, the interest rate was only 7%. The resource structure is stable over the next five years. There are no significant fluctuations

between the ratio of foreign capital and equity. The leverage ratio has been declining over the last 5 years, and thus the enterprise is reducing the value of foreign resources. Since foreign sources accounted for 33% of the total assets in 2018, the cost of foreign capital, which is linked to the amount of interest, must also be valued. Based on the indicator of interest coverage, we can assess that the enterprise is able to pay the cost of foreign capital from the generated profit. Based on the insolvency indicator, we can also positively evaluate the ratio of short-term liabilities to short-term receivables. The value of short-term receivables over 5 years exceeds the value of short-term liabilities. The insolvency indicator decreases over the reporting period. Overall, we can consider enterprise is solvency. The calculated indebtedness indicators are shown in Table 4.

Table 4 The indebtedness indicators

Indicator/Year	2014	2015	2016	2017	2018
Degree of Self-Financing	0.64	0.62	0.71	0.61	0.67
Degree of Indebtedness	0.36	0.38	0.29	0.39	0.33
Financial Leverage	1.56	1.61	1.41	1.64	1.50
Coverage of Interest	14.21	11.53	12.27	12.41	13.41
Interest Burden	0.07	0.09	0.08	0.08	0.07
Insolvency	0.97	0.94	0.94	0.79	0.72

Source: Own processing based on Enterprise financial statements.

Performance indicators of production processes are labor productivity, overall equipment efficiency, machine and process capability indices, non-conformance output to output, average profitability per worker. Labor productivity is the ratio of total output to labor inputs. It is considered a general indicator of productivity; the aim of the enterprise is to maximize this indicator. For productivity analysis, it is necessary to determine the units expressing the volume of production (money or in kind), the time period for which productivity is determined (annual, monthly, daily, hour new), the number and category of workers we detect. The total output can be given in cash or in kind. This indicator determines labor productivity per employee. Factors affecting labor productivity are technology, worker qualifications, motivation, natural and climatic conditions, and work organization. The productivity of workers in the enterprise is evaluated based on the production plan. During the reporting period, the implementation of the plan reaches more than 100%. The production plan was not only met but exceeded by the workers. In 2018, the plan was exceeded by 48.06%. For machines we focus on the use of equipment and its downtime. For production lines, productivity measurement is a combination of machine operations and manual workstations and downtime. Based on input data, we can quantify the productivity increase potential that exists and how to achieve it at the workplace (production line). We calculate the overall device efficiency as a product of availability, performance, and quality indicators. Availability expresses the ratio of values in the numerator the difference between the planned production time of the planned downtime and the unplanned downtime and in the denominator the value of the planned production time. The performance expresses the proportion of values in the numerator of the product of the production cycle and the number of pieces produced in the denominator the difference between the planned production time and the planned downtimes. Quality expresses the ratio of the values in the numerator the difference between the number of good pieces produced and the number of failures and the denominator of the total number of pieces. The ratio of non-commodities in outputs expresses the proportion of the number of non-commissions and total outputs. There are negative factors in the enterprise that affect production, such as downtime, material waiting, unskilled workers, production of junk, machine failures. The overall device efficiency of the enterprise is positive and reaches a relatively high value compared to the world class in this area, which is around 85%. The overall efficiency of the device increased to 89% in 2018. In the period under review, the enterprise managed to keep the ratio of offsets to total outlets close to zero, which means that they record a minimum of product failures and product claims.

Conclusion

Innovation in manufacturing processes in the enterprise leads to increased machine and employee productivity, and consequently to increased overall enterprise's performance and improved financial and economic indicators. The aim of the paper was to analyze enterprise's process innovations in the context of enterprise's financial performance enhancement and to assess opportunities to develop these processes as fundamental aspects of measurement and enhancement of the enterprise's financial performance. Based on the analyzed data, we evaluate the positive financial performance and performance of the process. The enterprise achieves positive results in the area of financial indicators and the stability and performance of the production process. The significant innovation of the selected enterprise is monitoring whether process performance increases or decreases over the previous year and predicts trends next year.

Based on the observation of the current state of processes in the enterprise, we recommend introducing innovation in the field of marketing strategy. Innovation is about emphasizing the ecological character of the enterprise in the context of the established environmental management system in the enterprise. Such an innovation of marketing strategy and communication would also correspond to the current trend of the enterprise and the constantly growing emphasis on the positive impact of enterprises on the environment. Based on the research results, we can state that the implementation of enterprise's process innovations has a significant impact on enhancing the enterprise's financial performance, assuming optimal control and coordination of all ongoing activities in the innovation process.SM

References

Borovský, J. (2005). *Manažment zmien – cesta k rastu konkurencieschopnosti*. Bratislava: Eurounion.

Cokins, G. (2004). *Performance Management – finding the missing pieces*. New Jersey: John Wiley & Sons.

Drucker, P. F. (2007). *Innovation and entrepreneurship: practice and principles*. Oxford: Elsevier Butterworth-Heinemann.

Čimo, J., & Mariaš, M. (2006). *Inovačný manažment*. Bratislava: Cicero.

Dugas, J., & Ferencz, V. (2015). *Manažérstvo inovácií*. Bratislava: Ekonóm.

Freeman, CH. (2008). *Systems of innovation: selected essays in evolutionary economics*. Cheltenham: Edward Elgar.

Germani, M., Luzi, A., Marilungo, E., Papetti, A., & Peruzzini, M. (2016). Investigating the sustainability of a high-energy consuming industrial process to achieve total quality. *International Journal of Productivity and Quality Management*, *18* (2-3), 301-324. https://doi.org/10.1504/IJPQM.2016.076712

Chan Kim, W., & Mauborgne, R. (2015). *Blue Ocean Strategy*. Boston: Harvard Business Review Press.

Kislingerová, E. et al. (2008). *Inovace nástrojů ekonomiky a managementu organizací*. Praha: Beck.

Lesáková, Ľ. (2008). *Inovatívny manažment vo vedomostnej ekonomike*. Banská Bystrica: Univerzita Mateja Bela.

Liu, L., & Jiang, Z. (2016). Influence of technological innovation capabilities on product competitiveness. *Industrial Management and Data Systems*, *116* (5), 883-892. https://doi.org/10.1108/IMDS-05-2015-0189

Mitea, D., & Raluca E. (2018). The expansion of digitally mediated labor: platform-based economy, technology-driven shifts in employment, and the novel modes of service work. *Journal of Self-Governance and Management Economics*, *6* (4), 7–13. https://doi.org/10.22381/JSME6420181

Nica, E. (2018). Gig-based working arrangements: business patterns, labor-management pactices, and regulations. *Economics, Management, and Financial Markets*, *13* (1), 100–105. https://doi.org/10.22381/EMFM13120185

Nica, E., Manole, C., & Stan, C. I. (2018). A laborless society? How highly automated environments and breakthroughs in artificial intelligence bring about innovative kinds of skills and employment disruptions, altering the nature of business process and affecting the path of economic growth. *Journal of Self-Governance and Management Economics*, *6* (4), 25–30. https://doi.org/10.22381/JSME6420184

Papulová, Z., Papula, J., & Oborilová, A. (2014). *Procesný manažment*. Bratislava: Kartprint.

Schumpeter, J., & Swedbeg, R. (1989). *Essays: On Entrepreneurs, Innovations, Business Cycles, and the Evolution of Capitalism*. New Brunswick: Transaction Publ.

Sponte Piştalu, M. (2018). Cognitive Performance and Labor Market Outcomes: Evidence from the U.S. Economics, *Management, and Financial Markets*, *13* (2), 70–75. https://doi.org/10.22381/EMFM13220185

Synek, M. (1996). *Manažerská ekonomika*. Praha: Grada Publishing.

Zalai, K. (2016). *Finančno-ekonomická analýza podniku*. Bratislava: Sprint.

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The influence of organizational justice on corporate performances

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Abstract
Professional and committed employees have always been a desirable resource in the portfolio of human resources of each company because their expertise and engagement can significantly affect the overall performance of businesses. The readiness to put the potential that have in the function of the company is, however, under the influence of a variety of factors, starting from the design of the job, through the reward system, to the possibility of promotion. As one of the most important factors, which is not sufficiently addressed in domestic literature, is the perception of organizational fairness, as well. This category refers on the degree to which employees believe that the decisions made in the company are fair, the procedures that are applied are fair, and the treatment of the employees to whom the decisions are made for are fair. Numerous empirical researches have shown that when a higher level of organizational justice is perceived in the company, it has a positive impact on the manifestation of organizational citizenship behaviour, job satisfaction, commitment, etc. Since all these forms of employees` behaviour and attitudes are positively correlated with individual, and thus overall, organizational, performances, organizational justice could be seen as one of the factors that can influence the performance that the company as a whole. Bearing in mind the above, the subject of the paper is to examine whether organizational justice has a statistically significant impact on the performance of companies in Serbia, and to what extent some forms of organizational justice (distribution, procedural and interactive) affect them. The aim of the paper is to propose mechanisms and measures based on the results of the research to managers, whose implementation can contribute to the increase of organizational justice in those segments that are poorly assessed. The starting assumption of the paper is that organizational justice has a statistically significant impact on company performance. In order to verify the validity of this assumption, the methods of correlation and regression analysis will be used. The analysis will be based on the data obtained from the primary research carried out in the companies mostly in the South East of Serbia. The theoretical implications of the paper are reflected in filling in the gaps in domestic literature regarding organizational justice and its possible implications, while empirical implications are reflected in the ability to increase the level of justices in the companies in Serbia by applying the proposed mechanisms and measures and thus positively influence attitudes, behaviour and performances of employees.
Keywords
Organizational justice, performances, employees, enterprise.

Introduction

It is a long-known fact that human resources are the bearers of working potential that can be used for achieving the organizational goals. However, to what extent this potential will really be used for their realization depends on a number of different factors. Numerous empirical studies have showed that the willingness of employees to put their competences at the disposal of the company is influenced by: job design (Garg & Rastongi, 2006; Sharon & Kubala, 2018), reward system

(Rynes, Gerhart, & Minette, 2004), possibilities of promotion (Njambi, 2014), quality of interpersonal relationships (Martin & Dowson, 2009), etc. However, one of the factors that draw attention for the last 20 years is organizational justice as well. This category refers on the degree to which employees consider that decisions, procedures and interactions in the workplace are fair (Adams, 1965; Leventhal, 1976; Bies & Moag, 1986; Greenberg, 1987; Baldwin, 2006). Accordingly, there are three types of organizational justice that differentiate in the literature: distributional, procedural, as well as interactional justice.

By studying the organizational justice many authors came to the conclusion that this is a very significant phenomenon that has a strong influence on the attitudes and behaviour of employees. In that line it has been found that organizational justice affects the level of employee commitment (Hassan, 2002), their willingness to manifest organizational citizenship behaviour (Jafari & Bidarian, 2012), job satisfaction (Al-Zu'bi, 2010), motivation (Latham & Pinder, 2005), etc. The explanation for influence of perception of justice on motivation Latham and Pinder (2005) found in the fact that employees' motivation often stems from the interaction between individuals, as well as between individuals and the environment, i.e. situations that are also important for judgment on organizational justice.

As all of the aforementioned phenomena are positively correlated with the performance of employees (Khan, Ziauddin, Jam, & Ramay, 2010; Bin, 2016; Basu, Kumar Pradhan, & Ram Tewari, 2017), and, thus, with the overall organizational performance, the importance of the concept of organizational justice is not questioned. Furthermore, despite of the fact that this is a quite often investigated topic in the literature, there is a still need for deeper studying of this category.

Starting from the above, as well as from the fact that organizational justice is not sufficiently studied in domestic literature, the subject of this paper is to examine the impact of this category on the performance that enterprises in Serbia realize. The aim of the paper is to suggest certain mechanisms and measures to the managers of domestic enterprises whose implementation can contribute to increasing the level of organizational justice in their enterprises and, consequently, make a positive impact on the results that those companies achieve.

The paper is structured as follows: in the first part of the paper the review of the literature on the concept of organizational justice is given and starting hypotheses are defined. The second part gives an overview of the results of the research and presents their discussion, while concluding remarks are given at the end of the paper.

1. The review of literature on organizational justice and development of hypothesis

The topic of justice in the literature is not new. The beginnings of studying of this category can be found in the ancient Greece (Cropanzano, Bowen, & Gilliland, 2007). In management, however, this topic begins to be studied in the 60s of the twentieth century. However, unlike the ancient Greeks who studied what is essentially fair, the authors in the field of management study what people (employees) believe that it is fair (Cropanzano et al., 2007). Consequently, organizational justice in management literature is defined as the degree to which employees consider that decisions, procedures and interactions in the work environment are fair (Adams, 1965; Leventhal, 1976; Bies & Moag, 1986; Greenberg, 1987; Baldwin, 2006).

The topic of organizational justice in an enterprise is usually analysed in the situations where adverse employment occurrences happen, such as, for example, dismissal of employees. However, the question of fairness is also important in many other situations and processes that occur on a daily basis in enterprises, especially those that fall within the domain of human resources management. It that regard, the question of organizational justice is important when it is about the performance assessment, rewarding, resolving conflicts, selecting candidates, hiring, etc. (Baldwin, 2006).

Employees as individuals usually judge fairness in the company when they are personally affected. In order to evaluate whether a situation/event was just or not, they compare this situation/event with a referent situation that serves as a "criterion of fairness" (Cropanzano et al., 2007). If employees consider that there is a negative deviation, this event will most likely be assessed as unfair. In such situation, there may be many negative consequences for employees, such as: stress, intention to leave the organization, withdrawal of professional energy from everyday activities, disgrace, etc. (Turnley & Feldman, 1999). All these situations further can have

negative consequences, both in terms of their performance, and the results that companies achieve.

Bearing in mind that a high level of organizational justice has a positive impact on phenomena such as organizational commitment, organizational citizenship behaviour, etc., and that the low level of justice is associated with negative occurrences and outcomes in the work environment, the hypothesis H1 that we are going to test in our study is as follows:

H1. The relationship between organizational justice and company performance is direct and statistically significant.

Organizational justice is not, however, a one-dimensional concept. Most authors consider this category as the constellation of three types of justice: distributive justice, procedural justice and interactional justice. Some authors also distinguish additional types of justice. Within the framework of interactional justice they distinguish interpersonal and information justice (Colquitt, 2001). However, for the needs of this paper we will observe organizational justice as a composition of three basic types of justice.

When it comes to distributive justice, it is, in the broadest sense, related to whether people estimate what they received from the organization as fair or not (Cropanzano & Molina, 2015). This form of organizational justice was the first that draw the attention of the authors and has been the subject of numerous researches (Cropanzano & Molina, 2015). It has theoretical foundation in two concepts: Adam's equity theory (1965) and the justice judgment model of Leventhal (1976).

The basic components of Adam's theory of justice (1965) are inputs and outputs. Inputs are seen as the contribution of individuals, while outputs are seen as the rewards that individuals received on the basis of their contribution. According to this concept, the reward allocation should be in line with the contributions of those who will receive the reward. Speaking of the relationship between inputs and outputs, Baldwin (2006) suggests that outputs can take the form of earnings, advancements, career development opportunities, job security, etc., while inputs relate to employee commitment, level of education, participation in training programs, experience, etc. The same author, further, states that since it is difficult to determine which level of reward follows a precisely determined level of input, judgment on the conveyance of reward distribution is based on relative comparison. In other words, employees assess distributive justice whether the same rewards are distributed for the same level of input for all employees in the company (Baldwin, 2006).

Another concept that also forms the foundation of the theory of distributive justice is Leventhal's justice judgment model (1976). The basic characteristic of this model is that when it is about the assessment of justice, the decision in not made only on distribution rule as it is in Adam's model, but on two additional rules: the rule of equality and the rule of needs. However, in different situations, more emphasis can be given to the certain rule, which makes this theory dynamic, unlike Adam's, which is considered to be static. According to the justice judgment model, individuals evaluate the fairness of decisions on the following rules (Leventhal, 1976):

- *Contribution rule* - this rule implies that the results of decisions are allocated in accordance with the contribution of individuals;
- *Rule of equality* - implies that equal contributions should be followed by an equal rewards;
- *Rule of need* - this rule means that those with higher needs need to receive a higher reward (for example, if spouses work in the same company, it should recognize their special needs when it is about using the annual leave, when making the schedule of work, etc.).

If employees consider that decisions made by the company are not fair, the negative affective, cognitive and behavioural reactions will occur (Cohen-Charash & Spector, 2001). In other words, the employees will be anger, dissatisfied and probably will reduce the level of engagement in order to establish a new ratio between inputs and outputs (Cohen-Charash & Spector, 2001). On the other hand, if distributive justice is perceived at a high level, employees can be expected to be more satisfied, motivated and more committed to the organization. This, furthermore, can lead to their higher performance, and thus overall organizational performance. Bearing in mind the above, the hypothesis H2 that we are going to test is as follows:

H2. Distributive justice has a positive and significant impact on company performance.

Procedural justice refers to the perception of the fairness of the procedures when decisions were made as well as during their implementation.

This phenomenon also has great importance for the attitudes and behaviour of employees and in some situations even greater than distributive justice has. Namely, it turned out that employees would be more willing to accept unwanted outcomes if they felt that the decision-making process was based on the principles of fairness. Practice has shown that employees consider procedural justice at a higher level if, before making a decision, they are given the opportunity to express their opinion or to communicate relevant information (Baldwin, 2006).

The perception of a higher level of organizational justice will occur if the Leventhal's rules (1976) are followed. These rules are:

- *Consistency.* This rule means that the same procedures should be applied to all employees, and that these procedures should be stable over a longer period;
- *Bias suppression.* This rule implies that the allocation process must be based on an objective basis that excludes any subjectivity and bias;
- *Accuracy of information.* This rule implies that the process of allocating of the outputs must be based on information and objective facts which minimize errors;
- *Correctability.* This rule means that modifications of procedures and processes should be enabled in case of need;
- *Representativeness.* This rule requires that, when implementing the procedures, the attitudes, values and perspectives of all the entities to which the process refer, should be taken into account;
- *Ethicality.* The rule of ethics implies that the processes in organization must be compatible with basic moral and ethical values and standards.

Speaking of the impact of procedural justice on the attitudes and behaviour of employees, some authors state that if employees consider the distribution of decisions to be unfair, the first question put by the employees is related to the procedures that produced such decisions. If they conclude that the procedures were not fair, they will probably reduce their performance in order to re-establish the "new" justice in the company (Kalay, 2016). On the other hand, if the procedures are fair, this has a favourable impact on the social exchange that takes place in the company. Namely, if management has demonstrated a commitment to the principles of fairness, it is possible to expect greater loyalty, the emotional attachment of employees with the organization, their greater engagement, etc., which usually leads to higher individual's performances (Khan et al., 2010; Bin, 2016; Basu et al., 2017; Sponte Piştalu, 2018), as well as organizational performances. Based on the above the hypothesis H3 that we are going to test in the study is as follows:

H3. Procedural justice has a positive and significant impact on company performance.

The third form of organizational justice is interactional justice. Although some authors consider that fairness in interactions falls within procedural fairness, thanks to its importance, some authors state that it can be viewed as a separate form of organizational justice (Bias & Moag, 1986). Namely, Bias and Moag (1986) state that in addition to the fact that employees evaluate fairness in the organization on the basis of some objective events and procedures, they evaluate fairness through social and communication criteria as well. Accordingly, these authors consider that it a justifiable to make distinction between fairness in interpersonal relations and fairness in the field of information.

Generally speaking, fairness in interactions relates to the attitude towards employees working in a company whether it is respectful (Baldwin, 2006). Bias and Moag (1986) have formulated certain principles whose implementation can contribute to the perception of higher level of fairness in interactions in the company. These are the following principles (Bias & Moag, 1986):

- *Truthfulness* – this principle means that information provided to employees should be realistic, accurate and presented in an open (transparent) and honest way,
- *Respect* – this principle means that relation towards employees should be with dignity and without any signs of insult or discourteous behaviour,
- *Propriety* – the meaning of this principle is that relation and statements should never be inappropriate or include the intention to hurt someone on the basis of race or gender,
- *Justification* – this principle means that if some form of injustice occurs giving additional explanation or apology may reduce or eliminate the sense of anger.

Overall, considering and respectful relationship of management towards employees

creates the felling of the employees that they are valuated and that they are an important part of the organization (Kalay, 2016). These positive feelings could encourage employees to reciprocate behaviour or even to demonstrate behaviour that go beyond their formal role (Nasurdin & Khuan, 2011). This, furthermore, can positively affect the performance achieved by individuals as well as the overall organizational performance. Based on the above the fourth hypothesis we are going to test will be as follows:

H4. Interactional justice has a positive and significant impact on company performance.

2. Sample and procedure

In order to verify the validity of these hypotheses, a primary research was conducted. We examined how employees in the Republic of Serbia perceive certain segments of organizational justice and is there a link between organizational justice and business performance. The survey was conducted from October 2017 to February 2018, by interviewing employees in the organizations in the south east of Serbia. The questionnaire included two sets of questions. The first group was general questions about gender, age, education, length of service and employee position in the company. The second group was made of questions related to employee attitudes about certain segments of organizational justice. The questions were formulated in accordance with the questionnaire created by Neihoff and Moorman (1993). Employees were asked to score from 1 to 5 on Likert scale (1 means "I do not completely agree" and 5 "completely agree") each segment of justice in the organization. There were more questions to analyze the perception of every form of justice.

The sample included 200 employees in 17 organizations operating in the territory of the Republic of Serbia (mostly south-eastern Serbia). Out of the total questionnaires distributed, 31 were rejected due to incomplete answers, and 169 were retained. In the structure of the sample, women accounted for 42.0%, while men were slightly higher and accounted for 58.0% of the respondents. As for the age structure, it was as follows: 10.1% consisted of respondents aged under 25, 42.0% respondents between 26 and 40 years, 40.2% were respondents between 41 and 55, 7.7 % respondents older than 55 years. Also, 66.2% of employees have secondary education, 20.7% have high education, while 9.5% have higher education, and only 3.6% have elementary education.

3. Results and discussion

The values of Cronbach's Alpha of 0.913 indicate a very good reliability and an internal matching of scales in the sample. According to the data in Table 1, the Correlated Item-Total Correlation column, it can be concluded that there is a high degree of correlation of each item with total results. Since all values in the Cronbach's Alpha if Item Deleted column are less than the final alpha value (0.913), we find it is justified that all items in the existing scale remain, and that this scale is comparable to researches based on such a scale. Table 1 also shows that the correlation of the pairs of items ranges from 0.679 to 0.748. This indicates that the correlation between the items is strong.

Table 1 Reliability of measurement scale

Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Distributive justice	,692	,829
Procedural justice	,748	,880
Interactional justice	,679	,827
Cronbach's Alpha	,913	
Sample size	**169**	

Source: Authors

Table 2 shows the average values of observed variables and deviations from the average. Based on the data in Table 2, it can be concluded that employees generally have a neutral attitude when it comes to organizational justice. Namely, organizational justice in enterprises is estimated at an average of 3.53, and the range of possible ratings ranges from 1 to 5. The data in Table 2 also show that distributive justice is best scored (3.94), while procedural justice (3.28) and interactional justice (3.39) got some lower grades.

Table 2 Descriptive statistics

Items	Sample	Minimum	Maximum	Mean	Std. Deviation
Productivity	170	150637.22	33285371.59	8776149.2897	9581489.97698
Distributive justice	170	1.00	5.00	3.9435	.85802
Procedural justice	170	1.00	5.00	3.2814	.69497
Interactional justice	170	1.00	5.00	3.3980	.82890
Organizational justice	170	1.00	5.00	3.5349	.68671
Valid N (listwise)	**170**				

Source: Authors

For verification of the validity of upper hypotheses, a multiple correlation and regression analysis was performed. The dependent variable in the model was the productivity of labour, measured as income per employee, while the independent variables were perceived as the level of distributive justice, procedural justice, interactional justice and total organizational justice. The results of the correlation analysis are shown in Table 3.

Table 3 Correlation of organizational justice and productivity in enterprises in Serbia

	Productivity	Distributive justice	Procedural justice	Interactional justice	Organizational justice
Productivity	1	,492**	,401	,347*	.435**
Distributive justice		1	,588**	,517**	.833**
Procedural justice			1	,719**	.877**
Interactional justice				1	.865**
Organizational justice					1

Source: Authors

The data in Table 3 show that there is an average, direct and statistically significant correlation (0.435**) between organizational justice and business performance of organizations in Serbia, measured by labour productivity. In other words, increasing of the perceived degree of organizational justice leads to an increase in productivity and, contrary, the decline in the perceived level of organizational justice is accompanied by a decline in productivity. Having in mind that the correlation is a statistically significant, we can conclude that our first hypothesis has been proven.

The data from Table 3 show that the correlation between productivity of labour, on the one hand, and certain forms of organizational justice (distributive, procedural, and interactional), on the other hand, is also direct and medium strong. In addition, the relationship between distributive justice and productivity is statistically significant at a significance level of 0.01 (0.492**). This means that increasing of perceived degree of distributive justice leads to an increase in productivity and, contrary, the reduction in the perceived level of distributive justice is accompanied by a fall in their productivity. In other words, if employees believe that what they receive from the organization is fair, estimated on the basis of their investment and engagement, they will do more and achieve greater productivity.

The data in Table 3, further, shows that the link between interactional justice and productivity is significant at the level of 0.05, but significantly weaker compared to the link between productivity and distributive justice. This means that increasing the perceived degree of fairness in interactions leads to an increase in productivity and, conversely, the reduction in the perceived level of fairness in interactions is accompanied by a decline in productivity. In other words, if employees perceive that the level of appreciation of their personality is greater, that they are provided with relevant information, they will achieve greater productivity.

Finally, Table 3 shows that the correlation between productivity and procedural justice is direct and moderately strong, which means that increasing the perceived degree of procedural justice leads to an increase in productivity and otherwise. However, this connection is not statistically significant, so the conclusion cannot

be generalized. The reason for this situation can be explained by the fact that the Serbian national culture is characterized by a great distance of power (Hofstede, 1984), people easily accept decisions of their subordinates, and so the impact of possible unjustified procedures in decision-making process has little effect on their behaviour and performance.

In order to examine the impact of the perceived level of justice on productivity, the regression analysis was done. The corresponding linear regression model that establishes the relationship between productivity, as dependent variable, and organizational justice (independent variable) has the following form:

$$y_i = 2.479.082{,}8 + 1.883.248{,}6 \cdot x_i \quad (1)$$

$$y_i - productivity$$

$$x_i - organizational\ justice$$

Thus, increase in the perceived level of organizational justice among employees in Serbia for 1 leads to an increase in earnings per employee for RSD 1,883,248.6 per year. However, this coefficient is not statistically significant, so the conclusion cannot be generalized, but it only applies to the observed sample of employees.

The results of the regression analysis are shown in Table 4.

Table 4 The impact of organizational justice on productivity in enterprises in Serbia

	Beta		Sig.
	Unstandardized	Standardized	
(Constant)	2714086,568		,462
Distributive justice	2350088,557	,216	,025
Procedural justice	572483,917	,042	,724
Interactional justice	1086925,116	,094	,398
R	,203		
R Square	,141		
Adjusted R Square	,123		
Dependent variable: Productivity			

Source: Authors

As Table 4 shows, the greatest impact on productivity has distributive justice (St.B=0.216). This coefficient is also statistically significant; therefore the second hypothesis of this paper is confirmed. The great importance that employees in Serbia give to distributive justice, which directly affects the performance of employees, can be explained by the fact that in Serbia the standard of living is extremely low and every form of reward has a major impact on the behavior of employees. For these reasons, if the rewards they receive for the effort invested is fairly estimated, they will work harder and achieve better performances. Otherwise, their results will be lower.

The data in Table 4 show that the impact of procedural justice and interactional justice is lower on productivity compared to the impact of distributive justice since their regression coefficients are not statistically significant. In other words, procedural justice and interactional justice have no statistically significant impact on employee productivity. Therefore, the hypotheses number three and four are rejected. This can be explained by the fact that there is a high level of irregularities, corruption and mistrust in Serbia for what are people used to it, so the organization's wrong behavior when making decisions, as well in interactions, is more or less expected and does not have a major impact on their behavior. Finally, it should be added that the shown model explains 12.3% of the variability in productivity.

Conclusion

Organizational justice is a very important dimension of every work environment because the level of fairness in decisions and processes directly reflects on the well-being of employees. The employees are particularly interested in decisions and processes related to rewarding, promoting, determining the possible surplus of employees, etc. Bearing in mind that organizational justice significantly influences the attitudes, behavior and performance of employees,

it can also be seen as a kind of managerial tool for improving the overall organizational performance.

This paper analysed the impact of organizational justice on labour productivity measured by revenue per employee. The research has shown that there is a positive and significant link between these variables. This, further, suggests that if employees perceive a higher level of organizational justice, this will also have a positive effect on productivity.

Taking into account that the organizational justice is the constellations of three forms of justice: distributive, procedural, as well as interactional, we have examined the impact of each of them on the productivity. The results of the regression analysis showed that only distributive justice has a statistically significant impact on the productivity of employees in the surveyed enterprises.

Based on the results obtained in the research in terms of the perceived level of all three forms of organizational justice, certain recommendations for managers in domestic companies in order to make human resources management system more just, could be made. These recommendations are as follows:

- When advertising the need to fill an vacant positions, it is necessary that job description to be realistic and thereby contributing to the employees being adequately informed on all relevant aspects of the job;
- The selection process should be identical to all candidates and evaluate those aspects of competencies that are relevant to vacant posts;
- When deciding on rewards, promotions, etc., employees' merits should be respected, that is, employees should be rewarded in accordance with the results they have achieved. In addition, the same results should be followed by the same rewards for all employees in the given enterprise;
- When evaluating the performance of employees, the assessment should be objective;
- A high level of justice is also important in resolving conflict situations. In this situation it is necessary to demonstrate all of three forms of organizational justice with emphasis on the procedural dimension;
- All procedures in the company should be transparent and impartial. Otherwise, there will be a climate of uncertainty and instability, which in the long run can have negative consequences for the functioning of the company and its results.

Although this paper represents a certain contribution to the enrichment of the local literature fund in the field of organizational justice, it is not without limitations. These limitations are primarily related to the size of the sample. Namely, similar research carried out in this area in the world included much larger number of observation units, and therefore the results of the research were more relevant for making certain conclusions and recommendations. The second constraint related to the sample is the fact that the survey covered respondents from only one region in Serbia who, according to the level of development, is lagging behind in comparison to others. Namely, the level of development of a certain region can determine the characteristics of the corporate culture (especially the attitude towards the employees), as well as the development of the procedures applied in companies, which can influence the attitudes of the respondents regarding fairness in the organization.

Finally, one of the constraints of the paper is related to the fact that the attitudes of the respondents about the justice in the organization are correlated with the performances at the organizational level, not with performances at individual level. The correlation between employees' attitudes about justice in organization and performance would be more direct if the performance of employees whose attitudes about fairness are examined were observed.

These limitations of the paper at the same time address the way for future research. Namely, future research in this field should be conducted on a much larger sample that would include a larger number of observation units from all parts of Serbia. Also, in the focus of research that examines the impact of employees' perceptions of organizational justice on performance, performance made by employees should be observed. Individual performance could be determined within the self-assessments process by using a certain scale. Another possibility for performance assessment of employees is to be carried out by their superiors. Also, in the future it would be useful to investigate employees' attitudes about fairness in certain segments of the human resources management system as this

would create the more accurate basis for implement measures for this system improvement.

Despite these limitations, we consider that this paper, however, will draw the attention of academic and professional public to the issue of justice in organizations, and will initiate some improvements in this area.SM

References

Adams, J. S. (1965). Inequity in social exchange. In: Berkowitz, L. (Eds.), *Advances in experimental social psychology*(pp. 267-299). New York: Academic Press. https://doi.org/10.1016/S0065-2601(08)60108-2.

Al-Zu'bi,H. A. (2010). A Study of Relationship between Organizational Justice and Job Satisfaction. *International Journal of Business and Management, 5*(12), 102-109.https://doi.org/10.5539/ijbm.v5n12p102.

Baldwin, S. (2006). Organizational justice. *Institute of Employment Studies*, pp. 1-13. Retrived February1, 2018, from http://www.employmentstudies.co.uk/system/files/resources/files/mp73.pdf

Basu, E., Kumar Pradhan, R., & Ram Tewari, H. (2017). Impact of organizational citizenship behavior on job performance in Indian healthcare industries: The mediating role of social capital. *International Journal of Productivity and Performance Management, 66* (6),780-796.

Bies, R. J., & Moag, J. F. (1986). Interactional justice: Communication criteria of fairness. In R. J. Lewicki, B. H. Sheppard, & M. H. Bazerman (Eds), *Research on negotiations in organizations* (pp.. 43–55). Greenwich: JAI Press.https://doi.org/10.1108/IJPPM-02-2016-0048.

Bin, A. S. (2016). The relationship between job satisfaction, job performance and employee engagement: An explorative study. *Journal Issues in Business Management and Economics, 4* (1), 1-8https://doi.org/10.15739/IBME.16.001.

Cohen-Charash, Y., &Spector, P. E. (2001). The role of justice in organizations: A meta-analysis. *Organizational Behavior and Human Decision Processes, 86*, 278-321.https://doi.org/10.1006/obhd.2001.2958.

Colquitt, J. A. (2001). On the dimensionality of organizational justice: A construct validation of a measure. *Journal of Applied Psychology, 86*, 386–400.https://doi.org/10.1037//0021-9010.86.3.386.

Cropanzano, R., &Molina, A. (2015). Organizational justice. Y: J. D. Wright (Eds.), *The International Encyclopedia of Social and Behavioral Sciences, Second Edition* (pp. 379- 384). Oxford, UK: Elsevier Press.

Cropanzano, R., Bowen, D. E., & Gilliland, S. W. (2007). The management of organizational justice. *Academy of Management Perspectives, 21*, 34–48.https://doi.org/doi:10.5465/amp.2007.27895338.

Garg, P., & Rastogi, R. (2006). New model of job design motivation employees Performance. *Journal of Management Development, 25* (6), 572–587.https://doi.org/10.1108/02621710610670137.

Greenberg, J. (1987). A Taxonomy of Organizational Justice Theories. *Academy of Management Review, 12*(1), 9-22. https://doi.org/10.5465/amr.1987.4306437.

Hassan, A. (2002). Organizational justice as a determinant of organizational commitment and intention to leave. *Asian Academy of Management Journal, 7* (2), 55-66.

Hofstede, G. (1984). *Culture's consequences: International differences in work-related values.*Newbury Park, CA: Sage.

Jafari, P. & Bidarian, Sh. (2012). The relationship between organizational justice and organizational citizenship behavior. *Procedia – Social and BehavioralSciences, 47,*1815–1820.https://doi.org/10.1016/j.sbspro.2012.06.873.

Kalay, F. (2016). The Impact of Organizational Justice on Employee Performance: A Survey in Turkey and Turkish Context. *International Journal of Human Resource Studies, 6* (1), 1-20.https://doi.org/10.5296/ijhrs.v6i1.8854.

Khan, R.M., Ziauddin, Jam, F.A., &Ramay, M. I. (2010). The Impacts of Organizational Commitment on Employee Job Performance. *European Journal of Social Sciences, 15* (3), 292-298.

Latham, G. P., & Pinder, C. C. (2005). Work motivation theory and research at the dawn of the twenty-first century. *Annual Review of Psychology, 56*, 485-516.https://doi.org/10.1146/annurev.psych.55.090902.142105.

Leventhal, G. S. (1976). Fairness in social relationships. In: Thibaut, J. W., Spence, J. T.,& Carson, R. C (Eds.),*Contemporary Topics in Social Psychology*(pp. 211-239). Morristown, NJ: General Learning Press.

Martin, A. J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. *Review of Educational Research, 79* (1), 327-365.https://doi.org/10.3102/0034654308325583.

Nasurdin, A. M., & Khuan, S. L. (2011). Organizational justice, age, and performance connection in Malaysia. *International Journal of Commerce and Management, 21* (3), 273-290.https://doi.org/10.1108/10569211111165316.

Niehoff, B.P.,& Moorman, R.H. (1993). Justice as a Mediator of the Relationship between Methods of Monitoring and Organizational Citizenship Behavior. *Academy of Management Journal,* 36 (3), 527-556. http://dx.doi.org/10.2307/256591

Njambi, C. (2014). Factors influencing employee motivation and its impact on Employee Performance: a case of AMREF health Africa in Kenya. Unpublished Thesis, Retrived March 1, 2018, from http://erepo.usiu.ac.ke/bitstream/handle/11732/77/Carol.pdf?sequence=1

Rynes, S. L., Gerhart, B., & Minette, K. A. (2004). The Importance of Pay in Motivation: Discrepancies between What People Say and What they Do. *Human Resource Management, 43* (4), 381-394.https://doi.org/10.1002/hrm.20031.

Sharon, S. & Kubala, P. (2018). Social Justice in the Workplace: Are On-Demand Companies Exploiting Current Regulatory Ambiguities and Workforce Precarity?*Psychosociological Issues in Human Resource Management, 6*(1), 166–171,https://doi.org/10.22381/PIHRM6120188.

Sponte Piştalu, M. (2018). Cognitive Performance and Labor Market Outcomes: Evidence from the U.S. *Economics, Management, and Financial Markets, 13*(2), 70–75.https://doi.org/10.22381/EMFM13220185.

Turnley, W. H., & Feldman, D. C. (1999). The impact of psychological contract violations on exit, voice, loyalty, and neglect. *Human Relations, 52* (7), 895-922. https://doi.org/10.1177/001872679905200703.

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Improving the placement of food products of organic origin on the AP Vojvodina market

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Abstract
The aim of this paper is to define suggestions and guidelines for improving the placement of food products of organic origin in the AP Vojvodina market. The main task is to identify and analyse indicators that the final consumers consider most important when purchasing food products of organic origin. The data was collected by field and electronic studies on a sample of 500 final consumers about their expectations, attitudes and habits in the purchase and consumption of organic food. Descriptive statistics was used for data processing, while multiple regression analysis was used to interpret results and test the established hypotheses. The results showed the existence of statistically significant correlations between different indicators, such as: quality label, origin of the product, composition of raw materials, freshness, price, taste, place of sale and packaging and consumers' decision to purchase an organic food product. The results of the research will serve as a basis for the creation of a regression model for the successful placement of food products of organic origin in the AP Vojvodina market. The practical significance of the research is reflected in the fact that it will indicate to the supply chain managers the indicators that need to be optimized to ensure more efficient placement of organic products on the national market. Suggestions and recommendations for future research are provided in the paper.

Keywords
Food products of organic origin, quality, consumer's expectations, product origin, supply chains.

Introduction

In previous studies, the authors point to an increasing share of organic food products in the consumer basket, which in the EU market ranges from 4.5% in the UK to 14% in Denmark (Wier, Jensen, Andersen, & Millock, 2008). Changes are also evident in the advertising activities, where an increasing significance on the global market is attributed to organic products. According to the results of a global study conducted in 2016, which included an analysis of 128 world journals, out of 579 advertisements published in these journals, 178 or 31% of them referred to organic food products (Gebhardt & Heinz, 2018). Data show that world demand for organic food products grows at an annual rate of 20%, while it is estimated that the retail sales of such products annually exceed $ 100 billion (US$), with the trend that 93% of global consumers expect placement of exclusively those products that are produced according to the highest ecological standards (Arsi, Donoghue, Venkitanarayanan, & Donoghue, 2019; Hjelmar, 2011). In line with this trend in the global market, consumers' expectations are growing (Popesku, 2018) as well, and therefore they consider organic food products to be better in taste, more natural, healthier and safer than conventional alternatives

for consumers and the environment (Kataria, Krishna, Tyagi, & Vashishat, 2019).

Unlike in developed countries, insufficient attention is paid to organic production, placement and consumption in our market. The data show that in the Republic of Serbia the share of organic land in the total land is only 0.44% or 15,000 ha with a total of 2,000 agricultural producers and processors (Gulan, 2017). Compared to EU countries where the placement of organic food products grows at an annual rate of 10-15% (Martić Kuran & Mihić, 2014), this growth rate in Serbia is estimated at only 2 to 3% (Končar et al, 2018).

However, the key provisions of *Serbia 2020 - the Concept of Development of the Republic of Serbia until 2020* anticipate a significant redesign of the role of traditional food products of organic origin as a holder of rural development and the overall economic potential of the Republic of Serbia (Stojanović & Ognjanov, 2012). In this context, this implies directing state subsidies to improving the placement of organic products, financial support for the development of organic production, allocation of tax incentives for organic producers, control and certification of organic food, etc. In addition, certainly the most important factor is the views of local consumers about their readiness to dominantly buy food products of organic origin (Grubor & Đokić, 2015).

Bearing in mind the mentioned aspects, *the subject of this paper* is the research of consumers' expectations of organic products on the market of AP Vojvodina. *The aim of the paper* is to define the significance of the indicators that final consumers consider most important when purchasing food products of organic origin. The obtained *results of the research* will serve as the basis for the creation of a regression model with proposals and guidelines for improvement of the placement of food products of organic origin on the market of AP Vojvodina.

The paper consists of the following sections. The introduction is followed by the *Theoretical background of the research* that pointed to the importance of supplying organic products and defined indicators that influence the placement of food products of organic origin. Based on the literature review, basic research hypotheses are established. The method, sample and variables of the research are presented in the chapter *Methodology*. The next chapter - *Results*, presents the results of the tests carried out. The chapter - *Discussion*, defines the regression model, summarizes the most important results of the conducted research and provides the guidelines for the improvement of the placement of food products of organic origin. The last chapter brings together proposals and guidelines for future research and points to the observed shortcomings of the conducted research.

1. Theoretical background and research hypothesis

Organic food products represent a significant segment of the entire supply chain. Research in the global market (Batte, Hooker, Haab, & Beaverson, 2007) shows that organic products must first be clearly differentiated into: 100% organic products, organic products (at least 95% organic), products produced with organic ingredients (at least 70%) and products with some organic ingredients (contain up to 70% of organic substances). Only the first three categories can use the word organic in their name. These are products obtained through a system of organic farming and production, without the use of chemicals, pesticides, additives, emulsifiers, artificial constituents, raw materials and fertilizers (Charter, 2001).

Consumers attach greater importance to these products especially in the food segment. The results of numerous studies confirm that the growth rate of organic foodstuffs by far exceeds the overall growth rate of the food market. In the period from 2002 to 2011, the overall growth rate of the food market was 33% compared to 238% of the growth rate of food products of organic origin (Koklic, Golob, Podnar, & Zabkar, 2019). Consumers consider fruits and vegetables, milk and dairy products and cereals as the most important organic products, while the organic meat market has seen the highest trend of growth in recent years (Nguyen, Nguyen, Nguyen, Lobo, & Vu, 2019).

Retail chains dominate in the placement of organic food products in the EU market by achieving 16-25% (Malta, Poland, Spain, Italy) up to 80-90% (Romania, Bulgaria, Denmark, Finland, Norway) when it comes to the sales of organic food (Brčić-Stipčević, Petljak, & Guszak, 2011). As a result of such developments, final consumers show a tendency towards proven safety, quality, composition and origin of food products. Research on the global market confirms the direct correlation between consumer safety in the quality and composition of organic products and the efficiency of placements (Wong & Tzeng, 2019; Končar, Marić, & Vukmirović, 2018; Truong, Yap, & Ineson, 2012).

In the global market, the most important indicators that influence the consumption of organic products are the health of consumers and producers (Truong et al, 2012), ecological reasons (Pearson, Henryks, Sultan, & Anisimova, 2013), sustainability (Jurjević, Bogićević, Đokić, & Matkovski, 2019), safety (Truong et al, 2012), ethical motives (Honkanen, Verplanken, & Olsen, 2006), cognitive quality knowledge (Sponte, 2018), etc. Similarly to these results, on the local market, and especially in the AP Vojvodina market, the conducted studies pointed to the following indicators that consumers value as crucial in the selection and purchase of food products of organic origin. The following is emphasized: geographical origin labels (Stojanović & Ognjanov, 2012), quality labels (Končar, Grubor, Marić, Vukmirović, & Đokić, 2019), trust in composition and quality (Grubor & Đokić, 2015), health safety (Prodanović, Kuzman, Jovović, & Ozegović, 2017; Vlahović, Puškarić, & Jeločnik, 2011), taste (Vehapi, 2015), brand (Kocić, Marinković, & Alimpic, 2016), etc. The most common reasons that discourage consumers from purchasing organic products in our market are as follows: price (30%), distrust in quality labels (22), poor supply (21%), unavailability (20%), etc. (Vehapi, 2015).

End-users show increasing interest in all aspects of quality, safety and trust in organic food ingredients. If the participants in the supply chain, i.e. the producers (processors), farmers and trade companies are trying to improve the placement of these products, the supply chain management needs to focus in particular on the following indicators: quality label, product origin, composition of raw materials, freshness, price, taste, place of sale and packaging.

Quality label refers to the certification and standardization of organic products. It is crucial to determine if and to what extent consumers pay attention and trust these labels in our market.

Product origin relates to the geographical origin, i.e. place of food production, whether it is domestic or foreign producers and whether the origin affects the differences in the expectations of the final consumers.

Composition of raw materials includes the content of pure organic substances of a food product without additives such as emulsifiers (E102, E103, E104, etc.), GMOs, additives, pesticides, chemicals, artificial colours, etc.

Freshness, as a product quality indicator, is a characteristic of the product's durability, indicates some changes in deterioration (meat and meat products) or rotting of the product (fruits, vegetables), indicates the presence of foreign matter in a product, damage to the packaging, etc.

Price, as a placement indicator implies the price at which food products are placed in retail facilities. It is usually 30% higher than the price of conventional food products, as a consequence of: small amount of placement, expensive technology, complex and costly certification procedure, expensive packaging, etc.

Taste can be a significant motive for the purchase of food products of organic origin. As an indicator, taste is especially pronounced in fruits, vegetables, meat and meat products, bread and pastry, where consumers consider organic foods more tasty than conventional food products (Kihlberg & Risvik, 2007).

Place of sale refers to the question of whether a place (selling facility) where a product is purchased can be a predictor of quality and consumers' certainty in the organic composition of food products. These can be: retail facilities, green markets, or purchasing organic food directly from a manufacturer (processor).

Packaging relates to the improvement of the ecological status of packaging. For organic product groups, this implies a good knowledge of their functional characteristics and the ecological status of packaging materials and waste, which means that the packaging must be made of environmentally friendly raw materials and biodegradable or recyclable materials, using renewable resources and energy sources.

The subject of the research set up in this way is operationalized through the following eight research hypotheses:

H_1 – Quality label is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_2 – Product origin is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_3 – Composition of raw materials is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_4 – Freshness is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_5 – Price is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_6 – Taste is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_7 – Place of sale is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

H_8 – Packaging is an indicator that has a statistically significant impact on consumers' decision when purchasing food products of organic origin.

The most important results of the research, comments related to testing of hypotheses and suggestions for improving the placement of food products of organic origin are presented below.

2. Methodology

2.1. Variables

The study included several variables for confirming or rejecting these hypotheses. These are: independent variable of interval type of measurement and dependent variable. The independent variable of the interval type of measurement includes the assessment (ranking) of the significance of each of the offered indicators to the final consumers' expectation when selecting and purchasing organic food. The individual contribution of each indicator is ranked on the basis of the Likert scale (1-5 ranks). The dependent variable is the expectation, i.e. consumers' decision on the selection and purchase of food products of organic origin, i.e. to what extent indicators, such as: quality label, product origin, composition of raw materials, freshness, price, taste, place of sale and packaging meet their expectations and affect the decision to purchase food products of organic origin.

2.2. Research sample

The research was carried out on a sample of 500 final consumers from the territory of AP Vojvodina. The obtained data are the result of the research within the short-term projects of special interest for sustainable development in AP Vojvodina in 2018, based on a research project: "Study on the sustainability of domestic manufacturers and trading companies in the placement of food and organic products in the AP Vojvodina market". The study was carried out in the period September 2018 - April 2019. The sample was dominated by female consumers (m=172 or 34.4%; f=328 or 65.6%), due to their greater willingness to participate in the research. The highest share of respondents in the sample had higher education (n=295 or 59%). However, the sample is uniform in terms of respondents' age, place of residence (urban/rural) and household income.

In order to determine the reliability and validity of the used measurement scales for each of the tested indicators, the Cronbach Alpha coefficient was used (Table 1).

Table 1 Values of Cronbach's coefficient alpha for scale reliability

Indicators	Cronbach's alpha
Quality label	.742
Product origin	.873
Composition of raw materials	.901
Freshness	.718
Price	.866
Taste	.849
Place of sale	.773
Packaging	.842
For all items	.897

Source: The Authors

The value of the alpha coefficient, which for all indicators is closer to 1 than 0, indicates that the applied scales have an excellent level of reliability, i.e. they are valid for measuring the attitudes and opinions of final consumers.

2.3. Research procedure

The research was carried out by field studies and electronically via an e-questionnaire that was sent to final consumers from the base of trading companies. The average filling time of the questionnaire was from 10 to 15 minutes. Questionnaires were sent to final consumers until there were 500 successfully completed questionnaires. A total of 643 questionnaires were distributed (response rate, n=77.76%).

The data were sorted and processed with the SPSS 20 statistical package. Respondents' answers were interpreted and analysed through descriptive statistics. Average values, as well as deviations for each indicator, are presented. Correlation between the indicators is determined by the Correlation matrix, while the accuracy of the set hypotheses is tested based on multiple regression analysis.

3. Results

The following table (Table 2) shows the average ranking of each of these indicators, i.e. the degree of agreement of the final consumers with the assertion that the analysed indicators significantly influence their decision to purchase food products of organic origin.

Table 2 Results of individual indicator ranking

No.	Indicators	Significance rank
1	Quality label	4.32
2	Product origin	3.94
3	Composition of raw materials	4.22
4	Freshness	3.14
5	Price	4.12
6	Taste	2.85
7	Sale of purchase	3.71
8	Packaging	2.68
9	For all items	4.08

Source: The Authors

The attached table shows that final consumers' decision to purchase organic food products in the AP Vojvodina market is most significantly affected by the indicator of quality label and composition of raw materials. Somewhat less significance respondents attach to price, product origin and place of sale, while the lowest degree of agreement is indicated for the indicators: freshness, taste and packaging of organic food. In addition to these descriptive indicators, the following table (Table 3) presents descriptive statistics by individual indicators.

Table 3 Descriptive statistics for the analysed indicators

Indicators	Min.	Max.	Mean	St. deviation
Quality label	2.33	5.00	4.3280	1.17874
Product origin	1.67	4.67	3.9492	.85697
Composition of raw materials	2.67	4.67	4.2203	.97461
Freshness	1.33	4.00	3.1499	1.24192
Price	1.00	4.67	4.1202	1.17582
Taste	1.00	3.97	2.8598	.84652
Place of sale	1.33	4.33	3.7114	1.01472
Packaging	1.67	3.67	2.6806	.49521

Source: The Authors

Quality label indicator (M=4.32; SD=1.18) implies that final consumers in the domicile market pay attention to quality certification and standardization that is incorporated in certified quality labels clearly displayed on the packaging or the food product itself. Quality labels can be national (e.g. *Best from Vojvodina*, *Organic product*, etc.) or international/EU labels (e.g. *Eco-label*, *Mobius strip*, *Forest Stewardship Council – FSC label*, etc.).

An equally important indicator is Composition of raw materials (M=4.22; SD=0.97). This implies that final consumers read declarations on products, composition of organic raw materials, identify emulsifiers, sweeteners, artificial additives and colours as being harmful to health, non-safe substances. The next indicator that consumers notice is the price (M=4.12; SD=1.18). However, what is specific for this indicator is the fact that consumers show a high degree of agreement that prices of organic products are significantly higher than products from conventional processing. A somewhat less significance is attributed to product origin (M=3.94; SD=0.86) and place of sale (M=3.71; SD=1.01). This result implies that consumers, if they receive a quality and safe organic product, do not find it important whether the product is of national or international origin, or whether they buy it in a retail facility, markets, or directly from producers. The middle ranking of impact is attributed to Freshness of product (M=3.15; SD=1.24) as a consequence of the fact that modern technology in the form of intelligent packaging indicates to consumers any change in the composition and texture of the product and thus timely warn them and affect their decision to purchase. Finally, organic food is the least selected for taste (M=2.86; SD=0.85) and packaging and design (M=2.68; SD=0.49). Some studies find that it takes time for consumers to adapt to the taste of organic products, because it is more intensive for non-organic alternatives due to artificial flavours and additives (Truong et al, 2012; Kihlberg & Risvik, 2007). When it comes to packaging, the problem in our market is the lack of modern packaging and its simple design, solely as a result of the fact that the investments in these promotional instruments would additionally raise the price of organic products.

Correlation matrix is applied in order to determine how the indicators interact with one another, i.e. which sets of indicators have the similar coefficients (Table 4).

Table 4 Correlation matrix for analysed indicators

Indicators	Quality label	Product origin	Composition of raw materials	Freshness	Price	Taste	Place of sale	Packaging
Quality label	1							
Product origin	.753**	1						
Composition of raw materials	.873**	.908**	1					
Freshness	.561**	.571**	.849**	1				
Price	-.247**	-.702**	-.495**	.388**	1			
Taste	.415	.323	.267	.258	.316	1		
Place of sale	.471**	.894**	.316**	.461**	.656**	.406	1	
Packaging	.138	.735	.401	.443	.567	.373	.482	1

** Correlation is significant at the level 0,01

Source: The Authors

In the given matrix, we note that the greatest deviations, i.e. the largest number of statistically significant differences, are indicated by indicators of Quality label, Composition of raw materials and Product origin. Observed individually in relation to each other, the highest coefficient of correlation is marked with Quality label and Composition of raw materials (r=0.873), Product origin and Composition of raw materials (r=0.908) and Composition of raw materials and Freshness (r=0.849). This means that if consumers are satisfied with the quality label, composition of raw materials and product origin, they will probably choose to buy that organic product. There is also a significant correlation between price indicators and other variables, however, with a negative sign. Deviations are not recorded for indicators Taste and Packaging.

In order to test hypotheses and to examine the influence and correlation of the indicated group of indicators on the decision to purchase food products of organic origin, a multiple regression analysis was applied. The Enter method, which includes all independent variables to predict the dependent variable, has shown that the regression model is statistically significant ($F(500;7) = 2.68$, $p<0.001$). In other words, a set of tested indicators statistically significantly predicts the decision to purchase of organic food in the AP Vojvodina market. It describes 67.8% of the variance of the criteria. In addition to the overall contribution of the set of indicators, the contribution of individual indicators was also examined (Table 5).

Table 5 Individual contribution of the indicator to the explanation of the dependent variable

Model	Standardized coefficient		t	Sig.
	Beta	St. error		
(constant)	1.22	1.472	2.476	.000
Quality label	.422**	.252	.306	.000
Product origin	.212**	.587	1.001	.000
Composition of raw materials	.747**	.172	.388	.001
Freshness	-.091*	.591	1.282	.003
Price	-.726**	,450	.060	.000
Taste	.202	.698	1.362	.057
Place of sale	.573*	.281	.295	.003
Packaging	.181	.583	.842	.124

** Significant at the level 0,01

* Significant at the level 0,05

Source: The Authors

Based on the presented data, it is noticeable that the decision to purchase food products of organic origin is statistically significantly predicted by Quality labels (B=0.422), Composition of raw materials (B=0.747) and Product origin (0.212), while contribution of Price is also statistically significant but in a negative direction (B=-0.726). This analysis has confirmed research hypotheses **H_1, H_2, H_3** and **H_5** which means that any change in these indicators statistically significantly affects consumers' decision on the selection and purchase of food products of organic origin on the market of AP Vojvodina. This correlation is positive in the case of Quality label, Product origin and Composition of raw materials, i.e. with a significant increase in the impact of these indicators, consumers are more determined to buy organic products, while the negative sign in Price means that the volume of organic food sales decreases with its growth. This result coincides with the results of related studies (Vehapi, 2015). Research hypotheses **H_4** and **H_7** are on the border of statistical significance, i.e. Freshness (B=-0.91)

and Place of sale (B=0.573) moderately affect the selection of food products of organic origin. Remaining research hypotheses **H_6** and **H_8** are not accepted because the indicators Taste (B=0.202) and Packaging (B=0.181) did not make a statistically significant contribution.

4. Discussion

The obtained results and the conducted tests indicate that final consumers from the AP Vojvodina market show a different level of interest in certain indicators when they make a decision on the purchase of organic products. They express a clear need for Quality label to be transparently emphasized, to check Composition of raw materials and Product origin, while they adversely react to high prices by withdrawing from purchase. In this context, based on the statistical significance in the previous table, it is possible to present the regression model (equation), which points to the individual significance of the analysed indicators on the placement of food products of organic origin on the market of AP Vojvodina (1).

$$y = 1.22 + 0.422x_1 + 0.212\,x_2 + 0.747x_3 - 0.091x_4 - 0.726x_5 + 0.573x_6$$

In the given equation, y represents the placement of food products of organic origin, while x marks independent indicators, such as: x_1 - quality label, x_2 – product origin, x_3 - composition of raw materials, x_4 – freshness, x_5 – price and x_6 – place of sale. Indicators that do not have a statistically significant contribution are not included in the regression model.

A defined regression model, for the purpose of a clearer interpretation, can be graphically presented in the following way.

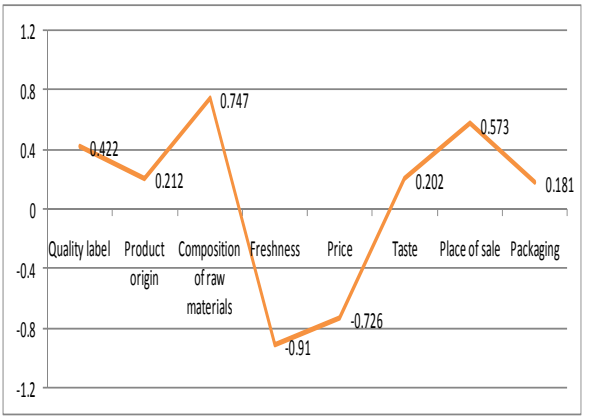

Figure 1 Placement of food products of organic origin
Source: The Authors.

The presented model points to indicators that supply chain managers need to optimize and develop in order to adjust the placement of organic food products to the needs and expectations of end consumers in the AP Vojvodina market. This implies that all participants in the supply chain must certify and standardize their production and service processes and through transparent labels and quality certificates clearly differentiate organic from inorganic alternatives in our market. The European Commission (EC) by its *Directive 2000/13/EC* unequivocally supports and encourages the introduction and protection of regional quality and origin labels. In our legislative system this area is regulated by the Law on Indications of Geographical Origin.

In addition to the quality label, a declaration must be marked on the packaging or the product itself, which confirms the organic composition of the product without additional flavour, colour, sweetener, emulsifier, etc. Furthermore, in the specification accompanying the product, manufacturers must guarantee the use of pesticides in fruits and vegetables, the method of feeding animals for meat and meat products, milk and milk products, etc.

The biggest challenge for the participants in the supply chain in the AP Vojvodina market is the price that has been indicated in several studies as one of the main limiting factors in the purchase of organic products in the regional market (Vehapi, 2015; Brčić-Stipčević et al, 2011). The organic production market, especially in the Republic of Serbia, is still underdeveloped and there is not enough large volume of consumption that could justify large investments in expensive technology, land, modes of transport, storage and placement of food products of organic origin. Their price is now about 30% higher than of conventional products, and therefore it is a challenge for manufacturers, farmers and trading companies to try to minimize unnecessary costs of change of ownership, storage and physical distribution through vertical integration and collaboration, in order to reduce the price of these products. The assumption is that it would amount to a maximum of 10% above the price of non-organic alternatives and thus make organic food more accessible to a growing number of consumers (Končar et al, 2018). Besides, many studies confirm that organic production can be next interesting an attractive placement for employment and growth of self-employment (Nica, 2018; Koppel & Kolencik, 2018).

A somewhat less importance is given to freshness and the place where food products are sold, although participants in the supply chain

should not neglect more efficient promotion of organic food, investments in modern packaging and packaging systems, improvement of taste through higher content of vitamins, nutrients, etc. Although these indicators do not currently have a statistically significant contribution, studies show that in the near future, larger investments in promotion, packaging and taste, along with all previously fulfilled indicators, will clearly differentiate food products of organic origin in our market.

Conclusion

The market of organic products, especially food products of organic origin, is constantly increasing. More and more participants in the supply chain are redirecting their production and service processes towards organic technology. As a result of such tendencies, demand for organic food is increasing. Hence, there is a need for researching the retail sector of food products of organic origin, due to the growing importance of this sector in the overall economic development of AP Vojvodina.

The obtained results showed that the final consumers, when choosing and purchasing food products, mostly appreciate Quality labels, Composition of raw materials, Price, Product origin, Freshness and Place of sale. Statistical tests have determined significant contributions of these indicators to the decision to purchase food products of organic origin. In other words, the conclusion of the research is that with the growth of these indicators, consumers show greater readiness to purchase organic products, except for the price where there is a negative correlation.

Growth in organic food prices is redirecting final consumers to purchasing alternative products from conventional processing.

The practical significance of the research is reflected in the fact that the presented results unambiguously show to the supply chain management and all participants, in which indicators it is necessary to invest and to what extent they need to be developed and optimized in order to make the placement of food products of organic origin more efficient, economical and profitable in the AP Vojvodina market.

The lack of research is the territorial limitation on the market of AP Vojvodina, exclusively as a result of the authors' knowledge of the structure of placements in the domicile market. This would result in suggestions for future research that should include a wider market segment (e.g. Western Balkans, South-eastern Europe), comparative analysis between EU and non-EU countries, analysis and influence of subindicators within the tested groups, etc.SM

References

Arsi, K., Donoghue, D. J., Venkitanarayanan, K., & Donoghue, A. M. (2019). Reducing Foodborne Pathogens in Organic Poultry: Challenges and Opportunities. In K. Venkitanarayanan, S. Thakur & S. C. Ricke (Eds.). *Food Safety in Poultry Meat Production* (pp. 25-46). Cham: Springer.

Brčić-Stipčević, V., Petljak, K., & Guszak, I. (2011). Kanali distribucije i obilježja tržišta ekoloških prehrambenih proizvoda. *Proceedings of XI. international scientific conference" Business Logistics in Modern Management*" (pp. 111-125). University of Osijek, Faculty of Economics and Business, Osijek, Croatia.

Batte, M. T., Hooker, N. H., Haab, T. C., & Beaverson, J. (2007). Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products. *Food policy, 32*(2), 145-159. https://doi.org/10.1016/j.foodpol.2006.05.003

Charter, M. (2001). Integrated product policy (IPP) and eco-product development (EPD), In *Environmentally Conscious Design and Inverse Manufacturing, 2001.* Proceedings EcoDesign 2001: Second International Symposium (pp. 672-677).

Gulan, B. (2017). Organska proizvodnja hrane u Srbiji 2017. *Makroekonomija*. Retrieved March 11, 2019 from: https://www.makroekonomija.org/0-branislav-gulan/organska-proizvodnja-hrane-u-srbiji-2017/.

Gebhardt, B., & Heinz, L. (2018). *Wirbt Bio anders? Inhaltsanalytischer Vergleich von Printanzeigen für Bio-Lebensmittel und konventionelle Lebensmittel*. 15.Wissenschaftstagung Ökologischer Landbau Beitrag.

Grubor, A., & Đokić, N. (2015). Determinants of choice of global and national food products' brands. *Strategic Management, 20*(2), 58-67.

Hjelmar, U. (2011). Consumers' purchase of organic food products. A matter of convenience and reflexive practices. *Appetite*, *56*(2), 336-344. https://doi.org/10.1016/j.appet.2010.12.019

Honkanen, P., Verplanken, B., & Olsen, S. O. (2006). Ethical values and motives driving organic food choice. *Journal of Consumer Behaviour: An International Research Review, 5*(5), 420-430. https://doi.org/10.1002/cb.190

Wier, M., Jensen, K. O. D., Andersen, L. M., & Millock, K. (2008). The character of demand in mature organic food markets: Great Britain and Denmark compared. *Food Policy, 33*(5), 406-421. https://doi.org/10.1016/j.foodpol.2008.01.002.

Jurjević, Ž., Bogićević, I., Đokić, D, & Matkovski, B. (2019). Information Technology as aFactor of Sustainable Development of Serbian Agriculture. *Strategic Management, 24*(1), 41-46. https://doi.org/10.5937/StraMan1901041J

Končar, J., Marić, R., & Vukmirović, G. (2018). Challenges of vertical integration of supply chains' members of food and organic products with domestic origin. *Anali Ekonomskog fakulteta u Subotici*, *54*(40), 149-169. https://doi.org/10.5937/AnEkSub1840149K

Končar, J., Grubor, A., Marić, R., Vukmirović, G., & Đokić, N. (2019). Possibilities to improve the image of food and organic products on the AP Vojvodina market by introducing a regional quality label. *Food and Feed Research, 46*(1). 111-124. https://doi.org/10.5937/FFR1901111K

Kocić, M, Marinković, V, & Alimpic, S. (2016). Merenje vrednosti Brenda za potrošače: Empirijski dokazi sa tržišta prehrambenih proizvoda u Srbiji. *Anali Ekonomskog fakulteta u Subotici*, *52*(35), 189-206.

Koppel, J., & Kolencik, J. (2018). The future of workers: Contingent forms of labor contracting in the platform economy. *Psychosociological Issues in Human Resource Management, 6*(1), 172-177. Retrieved March 11, 2019 from: https://www.ceeol.com/search/article-detail?id=665240.

Kihlberg, I., & Risvik, E. (2007). Consumers of organic foods–value segments and liking of bread. Food quality and preference, 18(3), 471-481. https://doi.org/10.1016/j.foodqual.2006.03.023

Kataria, Y. S., Krishna, H. G., Tyagi, V. K., & Vashishat, T. (2019). Consumer Buying behavior of Organic food Products in India Through the Lens of Planned Behavior Theory. *Research Journal of Humanities and Social Sciences*, *10* (1), 60-67. https://doi.org/0.5958/2321-5828.2019.00011.1

Koklic, M. K., Golob, U., Podnar, K., & Zabkar, V. (2019). The interplay of past consumption, attitudes and personal norms in organic food buying. *Appetite*, *137*, 27-34. https://doi.org/10.1016/j.appet.2019.02.010

Martić Kuran, L., & Mihić, M. (2014). Primjena teorije planiranog ponašanja u kupovini ekološke hrane. *Market-Tržište*, *26* (2), 179-197. https://doi.org/0000-0003-0234-941X

Nica, E. (2018). Gig-based working arrangements: Business patterns, labor-management practices, and regulations. *Economics, Management, and Financial Markets*, *13* (1), 100-105. Retrieved March 11, 2019 from: https://www.ceeol.com/search/article-detail?id=638336

Nguyen, H. V., Nguyen, N., Nguyen, B. K., Lobo, A., & Vu, P. A. (2019). Organic Food Purchases in an Emerging Market: The Influence of Consumers' Personal Factors and Green Marketing Practices of Food Stores. *International journal of environmental research and public health*, *16* (6), 1037-1047. https://doi.org/10.3390/ijerph16061037

Pearson, D., Henryks, J., Sultan, P., & Anisimova, T. (2013). Organic food: Exploring purchase frequency to explain consumer behavior. *Journal of Organic Systems*, *8* (2), 50-63. Retrieved from: https://www.researchgate.net/profile/Joanna_Henryks/publication/261474774_Organic_Food_Consumers_Exploring_Purchase_Frequency_to_Explain_the_Attitude-Behaviour_Gap/links/0deec53461ea8ce1e9000000.pdf

Popescu, G. H. (2018). Participation in the sharing economy: Labor, exchange, and consumption. An empirical analysis. *Journal of Self-Governance and Management Economics*, *6* (1), 122-127. Retrieved March 11, 2019 from: https://www.ceeol.com/search/article-detail?id=642535.

Prodanović, R., Kuzman, B., Jovović, D., & Ozegović, L. (2017). Market and trade of organic fruits in Serbia. *Economics of Agriculture, 64* (1), 141-155. https://doi.org/10.5937/ekoPolj1701141P

Sponte, M. (2018). Cognitive Performance and Labor Market Outcomes: Evidence from the Us. *Economics, Management, and Financial Markets*, *13* (2), 70-75. Retrieved March 11, 2019 from: https://www.ceeol.com/search/article-detail?id=676866.

Stojanović, Ž., & Ognjanov, G. (2012). Strateška opredeljenja Srbije u domenu ruralnog razvoja-proizvodnja i marketing tradicionalne hrane. *Economic Themes*, *50*, 19-32.

Vlahović, B., Puškarić, A., & Jeločnik, M. (2011). Consumer Attitude to Organic Food Consumption in Serbia. *Bulletin: Economic Sciences Series, 43*, 45-52. Retrieved March 11, 2019 from: http://www.upg-bulletin-se.ro/archive/2011-1/6.%20Vlahovic_Puskaric_Jelocnik.pdf.

Vehapi, S. (2015). Istraživanje motiva potrošača koji utiču na kupovinu organske hrane u Srbiji. *Ekonomske teme, 53* (1), 105-1021. Retrieved March 11, 2019 from: http://економске-теме.срб/pdf/et20151_07.pdf.

Truong, T. T., Yap, M. H., & Ineson, E. M. (2012). Potential Vietnamese consumers' perceptions of organic foods. *British Food Journal, 114* (4), 529-543. https://doi.org/10.1108/00070701211219540

Wong, W. M., & Tzeng, S. Y. (2019). Consumers'psychographics and green consumption intention: community supported agriculture business model in China. *International Journal of Business & Society, 20* (1), 229-246.

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Study of the problems of technological integration in the manufacturing industry in Russia

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Abstract
The strategy of scientific and technological development of the Russian Federation defines the priority areas that are believed to become a foundation for innovative development of the domestic market of products/services and will contribute to the transition to environmentally friendly and resource-saving energy, increase the efficiency of production and deep processing of hydrocarbons. In the context of global competition, emphasis is placed on the creation of institutional, financial and legislative mechanisms to ensure the harmonization of scientific, technological, innovation, industrial, economic and social policies.
The need to promote technological resources of industrial manufacturing enterprises determined the relevance of research of the technological integration process, as these enterprises are the key to the economic growth of the country and are in a dire need of a technological breakthrough.
The aim of the article is to study the problems of formation and development of technological integration of manufacturing enterprises in the Russian Federation in the context of priority scientific and technological development of the Russian economy.
The article uses a wide range of general scientific methods: description, generalization and abstraction, construction of concepts, argumentation, and comparison. The main methodological approaches used in the article are: system and process approaches that find their refraction in the scientific and practical material of the general theory of systems, organization theory, as well as technical and technological approach.
A fundamental change in the situation in the manufacturing industries entails the need to diversify the refining sector, which consists in upgrading the production capacity of high-quality semi-finished products for the petrochemical industry. World experience shows that the synergetic effect of the integration of oil refining and petrochemicals provides savings of up to hundreds of millions of dollars a year, and the main part of successful integration projects, located in the Persian Gulf countries, implements a strategy for the production of high-quality raw materials and petrochemical products.
When solving the problems of transition to deep resource-saving technologies in the manufacturing industry, it becomes obvious that it is necessary to develop and implement special management technologies that will form the basis of the strategy of the technological revolution of the domestic industrial complex. According to the laws of technologization, this occurs within the framework of the formation of the sixth technological structure in the world economic system, characterized by the development of intelligent technologies such as "smart plant", as well as the living design of business processes. In this regard, technological integration, as a direction of system technologization, should be a scientifically based concept, which includes a set of mechanisms, tools and methods for practical implementation in the industrial enterprises of the Russian economy.

Keywords
Technological integration, manufacturing industry, strategy, innovation, high-tech products, added value.

Introduction

A comprehensive view of the technological integration problem in the manufacturing industry of Russia in terms of innovative transformation of strategic management.

At the industrial enterprises of the manufacturing industry, the need for a complex of organizational, technical, financial and economic studies aimed at identifying the problematic aspects of technological integration, and the transition to a new round of technologizationis actualized.

According to the information of the Ministry of Energy of the Russian Federation, modernization of oil refineries and introduction of new capacities of secondary processes are implemented mainly by enterprises of the group of vertically integrated oil companies. Statistics of the last ten years show that the growth of oil refining is accompanied by an increase in the depth of processing only in enterprises that are part of the integrated economic structures, which indicates the most effective way to promote new technologies within the framework of sustainable links along the value chain.The prerequisites for the accelerated pace of technological integration arose both within the industrial giants and from the destabilization of external factors of functioning in the conditions of failures of agreements on the supply of technological equipment by Western partners. Despite the deterioration of the business climate, the development of the industry continues, the process of technology development involves domestic research and production laboratories, specialized research structures, members of cluster associations (Druzhinin & Dong, 2018).

Scientific research expenditures, which are related to the costs of creating new knowledge and are classified by scientists as dynamic resources, together with the diversification of skills and competencies, are gradually increasing (Mitea, 2018).However, practice shows that the volume of capital injections into the development of scientific and technological potential of industrial manufacturing enterprises is insufficient. The forecasted efficiency of investment investments was not always achieved by the results of production modernization programs, which determines the importance of the development and implementation of special methods of monitoring costs in the development of fixed capital (Popescu, et al., 2018). The strategy of effective development of investments for the purpose of transition to deeper technological processes is designed to ensure the competitiveness of Russian industry in the world economy.

From the point of scientific significance, the study of technological integration in the manufacturing industries of the Russian Federation will complement the existing approaches to scientific and technological policy at the enterprises of oil refining and petrochemical industries and will supplement the theory of organization with methodological provisions that reveal the essence and content of the conditions and factors of the process of technological integration. This will provide a scientific basis for the methodology of formation of the strategy of scientific and technological development of economic entities in related industries.

1. Methodology

Scientific background to the study of technological integration.

The study of technological integration is inextricably linked with the development of ideas of scientists and economists about the functioning of economic entities with the use of stable and short-term relationships. The gradual unification of the parts and the whole entails the emergence of a system of links between the elements, as a result of which the individual parts lose some of their original identification qualities, acquiring new properties. The main ideas of the development of integration processes in economic systems can be divided into three approaches.

First approach. Its supporters are scientists Gerasina Y., Ilyin M., Machula I., Razmanova S., Khusainov B. They believe that integration at the level of economic structures, in particular the integration of technologies has signs of the formation of the industrial policy of the state, to a greater extent, this applies to economic entities. In particular, Gerasina Y. puts forward indisputable postulates about the role of economic structures in creating favorable opportunities for inter-sectoral cooperation of social work, focusing on the fact that the association of enterprises allows them to carry out large-scale and effective scientific projects, thereby contributing to a global transformation of society from an industrial stage to an information (Gerasina, 2016).The attention of researchers is focused on the search for mechanisms of sustainable industrial growth (Kovacs, 2018). It is established that in the conditions of economic crisis measures of the

state support directed on joint work with the integrated complexes play essential importance. This dependence has become a characteristic feature of the production, technological and marketing processes of large companies in developing countries, including transnational corporations of China, Brazil, India, Malaysia, whose experience is especially important in connection with the expansion of the geography of Russian industrial associations in the Eastern direction (Wu, Harrigan, Ang, & Wu, 2019**)**. According to scientists, the main role in the formation of effective industrial policy is played by technology, involving innovative systems at the state level in a single chain through global transnational corporations (Oughton, et al., 2018).Indeed, integrated economic structures are able to combine the components of the country's national wealth in the form of human capital, fixed assets, minerals, and high-tech intellectual resources (Hardingham, Vrbka, Kliestik, & Kliestikova, 2018). At the same time, production structures closely interact with the financial sector, government agencies, participate in the infrastructure construction of regions, they can act as "customers" of personnel with pre-demanded competencies in supporting educational institutions, be the initiators and executors of innovative projects (Grossman, 2018). The breadth and purpose of relationships, as well as their maintenance in society, form the basis for the development of industrial companies of a new type.

Second approach. Representatives of the second approach Arutyunova D., Gomtsyan S., Ivanov Yu., Milner B., Boschma R., Hartog M., Dahmen A. consider technological integration as a way to regulate the production activity of complex economic structures. A wide range of studies is reduced to the fact that the integration of technologies is a part of the integration strategy of economic entities.German researcher Dahmen A. focuses on the integration process from the perspective of mechanisms of complex systems management, defining the relationship between development strategy and business reorganization (including through mergers and acquisitions, M&A) as key factors. If we take into account the cases when the reorganization is aimed at the future growth of the company, such development necessarily affects the increase in production capacity on the basis of new technologies (Neary, et al., 2018). Consequently, the individual strategy of economic structures affects the disclosure of the production potential of the entire industrial complex and increases its capitalization.

Scientists have found that integration associations occur in cycles or waves. For example, so-called "endogenous waves" in vertically adjacent industries combine the advantages of vertical and horizontal mergers. Life cycles of industrial enterprises fit into the overall economic cycles and are being changed under their influence (Yao, & Zhou, 2015). In this regard, certain dependence can be applied to the development of technological integration, when the sphere of potential changes is in constant motion, and along with technological resources, business processes, property complex, capital, organizational and legal form of activity, management system and structure, strategy and management tactics are subjects to change (Vochozka, et al., 2018).

Third approach. Adherents of the third approach Vishnevsky, Batkhin, Valitov, Klepikov and Proskuryakova (Proskuryakova, 2017) believe that technological integration, as the integration of the company's resources, is provided by the synergetic effect of the combined economic structures.Among the "private synergies" of technological integration are the effects of consolidation, such as savings in administrative costs due to the growth of the scope of activities and the centralization of special services, the combination of complementary resources, including technologies, as well as the increase in the market niche of the corporation and the diversification of assets.By combining complementary technologies, additional value is created, as well as value added, which refers to the amount of resources that is generated directly in the enterprise and can be expressed in terms of the total amount of wages, profits, financial costs of interest on borrowed credit resources, as well as depreciation, when it comes to renewable value through the reuse of production capacity.

The modern approaches of Russian specialists Vishnevsky, Karasev, and German researcher Meisner, are based on foresight studies and road mapping of the production process (Vishnevskiy, Karasev, Meissner, Razheva, & Klubova, 2017). The methods of building complex integrated systems directly link the integration process from the development of the strategy at the entrance to the control of information on integrated business units at the output (Proskuryakova, 2017).

Technological integration can expand the so-called "strategic economic zone" (abbreviation

SEZ), i.e. the segment of the market of high-tech products, which is of interest to end users. This zone can be increased by "penetration of the company into new product areas associated to varying degrees with the produced products". Preventive measures should come from a structural unit called the "strategic economic center" (abbreviated as the SEC)."The concept of SEZ and SEC" is of particular importance in modern conditions, when the requirements for standardization of products and services in order to develop promising markets have become stricter. In this case, we can use the idea of "structural functionalism" of D. E. Durkheim, T. Parsons, N. Smelser, describing the economy as a social system that seeks to integrate its elements through the performance of functions: adaptation to the external environment, achievement of goals, internal coordination and integration, preservation of reference points. The application of these functions to modern economic structures is considered by the author as an opportunity to give the process of technological integration a natural order, the ability to manage the production, economic and research activities of enterprises effectively.

As a prospect, the implementation of the stated scientific ideas must necessarily combine the functional areas of industrial enterprises: production and technological process, economics and research work (Nica, 2018).

2. Results of research

Analytical assessment of technological integration.

The Russian oil industry includes oil production, refining, transportation, sales of oil and petroleum products. At the primary stage there are involved 1,500 oil fields, about 800 of which are under development.According to the Ministry of Energy of the Russian Federation in 2017 oil refining and gas condensate on the territory of the country and the industrial production of commodity petroleum products from all types of crude oil was carried out by 80 special oil refining and gas processing companies, including:

- 28 large oil and gas refineries (with a capacity of 1 million tons of oil per year; with a total capacity of about 300 million tons of oil per year, or 86.3% of the total Russian capacity), members of vertically integrated oil companies;
- 9 oil refineries, not included in the structure of vertically integrated oil companies, or controlled by two or more shareholders, i.e. "independent refineries" (primary processing capacity of 33.8 million tons per year, or 10.8% of the total Russian capacity);
- 34 mini-refineries, including enterprises owned by vertically integrated oil companies (primary oil refining capacity of about 9.0 million tons of oil per year, or 2.9% of the total Russian capacity).

The modern structure of the oil industry is dominated by large vertically integrated oil companies. The most powerful of them are such oil and gas corporations as PJSC "Gazprom", PJSC "LUKOIL", JSC "NK "Rosneft", OJSC "Surgutneftegas", PJSC "Tatneft", JSC "ANK "Bashneft" (since October 2016 PJSC "NC "Rosneft" controls 50,0755% of the shares), PJSC "NOVATEK", OJSC "Sakhalin Energy Investment Company Ltd." (JV), JSC "NKG Slavneft" (JV), JSC NK "RussNeft". Oil refining is represented by large enterprises: PJSC "Gazprom Neft", OJSC "TAIF NK", JSC "Forteinvest" (the part of JSC "Orsknefteorgsintez"), JSC "Antipinsky oil refinery", LLC "Neftegazindustriya" (it includes OOO "Afipsky refinery"), JSC "Neftekhimservis" (it includes LLC "Yaya refinery"), JSC "Novoshakhtinsk factory of oil products", etc. Transportation of oil and oil products is carried out mainly by enterprises of the joint stock company PJSC "Transneft".

The volume and depth of the hydrocarbon raw materials processing in the period 2005 - 2017 had the dynamics of growth (figure 1). The depth of processing continues to grow; the volume of processing is reduced for objective reasons of the state of the oil market. The peak value of the commissioning of new and reconstructed oil refining plants fell on the pre-crisis for the industry in 2012 - 19 plants.

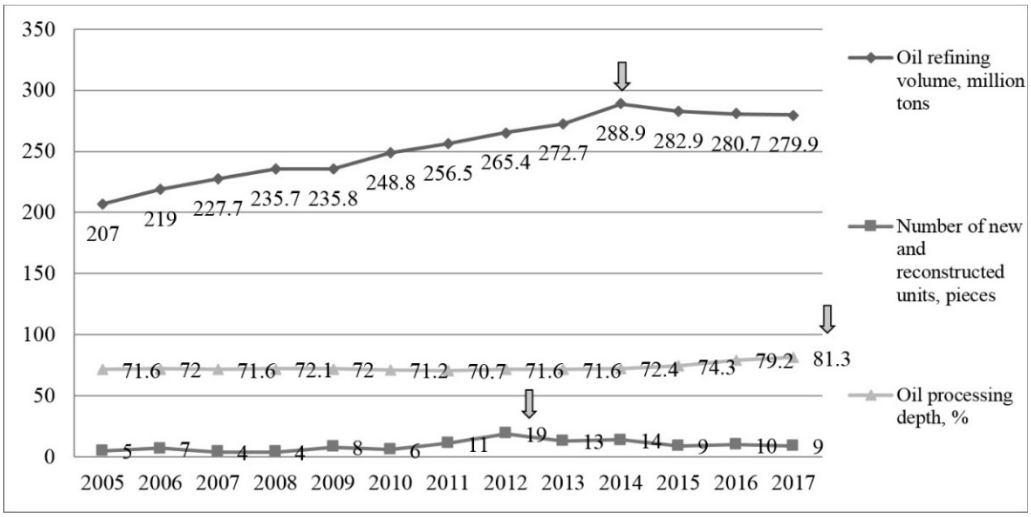

Figure 1 Dynamics of development of oil refining industry of the Russian Federation for 2005-2017
Source: Official website of the Ministry of Energy of the Russian Federation, 2019.

In 2015, instead of updating 27 installations, only 9 installations were retrofitted (figure 2). The main reason for the failure of the timing of implementation is the lack of planned supply of technology and equipment from Western contractors. Mobilization on internal sources of technological integration allowed increasing the depth of oil refining to 81.3% in 2017. This contributed to a painless transition to the use of motor fuel only of the highest environmental class in Russia.

The main factor of long-term technological development is the inflow of capital investments. Statistics show that the manufacturing industry is directly dependent on the current economic conditions due to the consequences of the global crisis and sanctions restrictions on the supply of equipment and technologies, including dual-use products, and therefore, these industries are experiencing negative dynamics of investment in fixed assets.

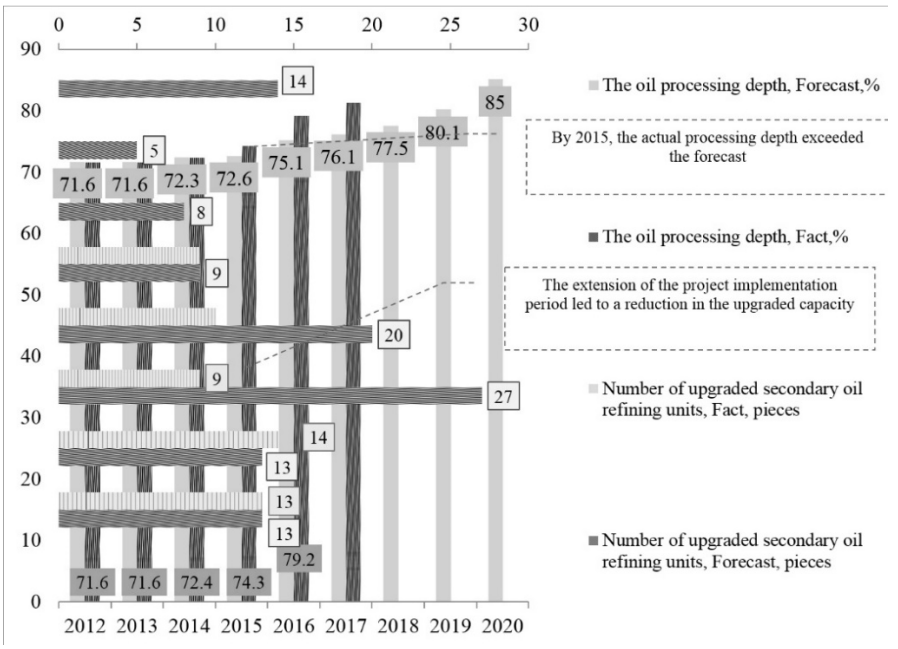

Figure 2 Comparison of forecast and actual indicators of development of oil refining industry of the Russian Federation for 2005-2015
Source: The Ministry of Economic Development of Russia, 2014.

In the period of 2016 – 2017 the situation stabilized, but this required the introduction of strict economy and cost optimization, including the development of new technologies (figure 3).

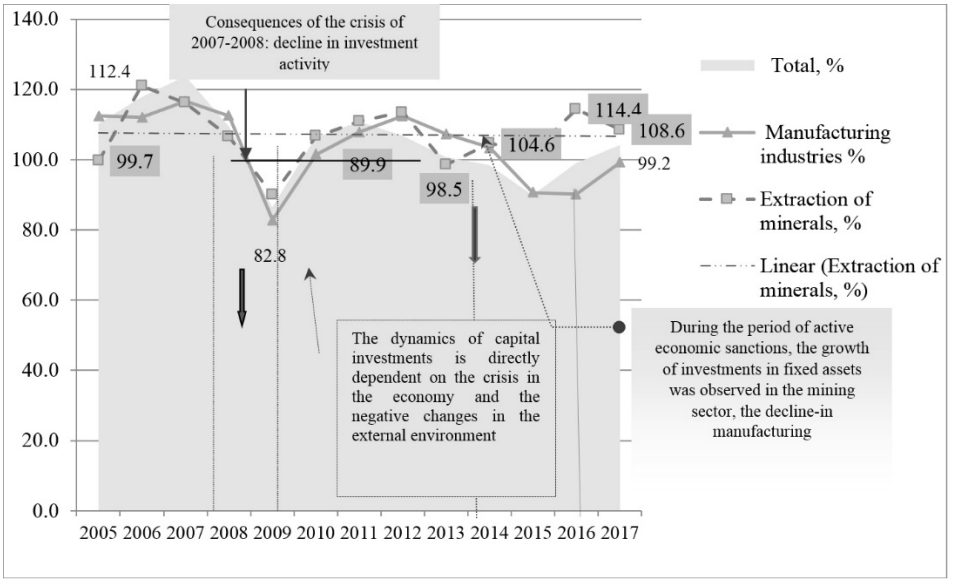

Figure 3 Dynamics of investments in fixed capital (in comparable prices) in the Russian Federation for the period 2005-2017, as a percentage of the previous period
Source: The Federal state statistics service of the Russian Federation, n.d.

Financial support for technological integration is supported by companies and the state in the framework of special programs. There is a gradual overcoming of the existing deformation of technical and technological equipment of production by increasing capital investments in the development of the vertical chain. The share of capital investments in the reconstruction and modernization of production facilities decreased after 2012, while the volume of long -term financing of chemical production increased significantly; so in the period 2005-2017 industry investments in the reconstruction and modernization of chemical production exceeded the same figure for the country (figure 4).

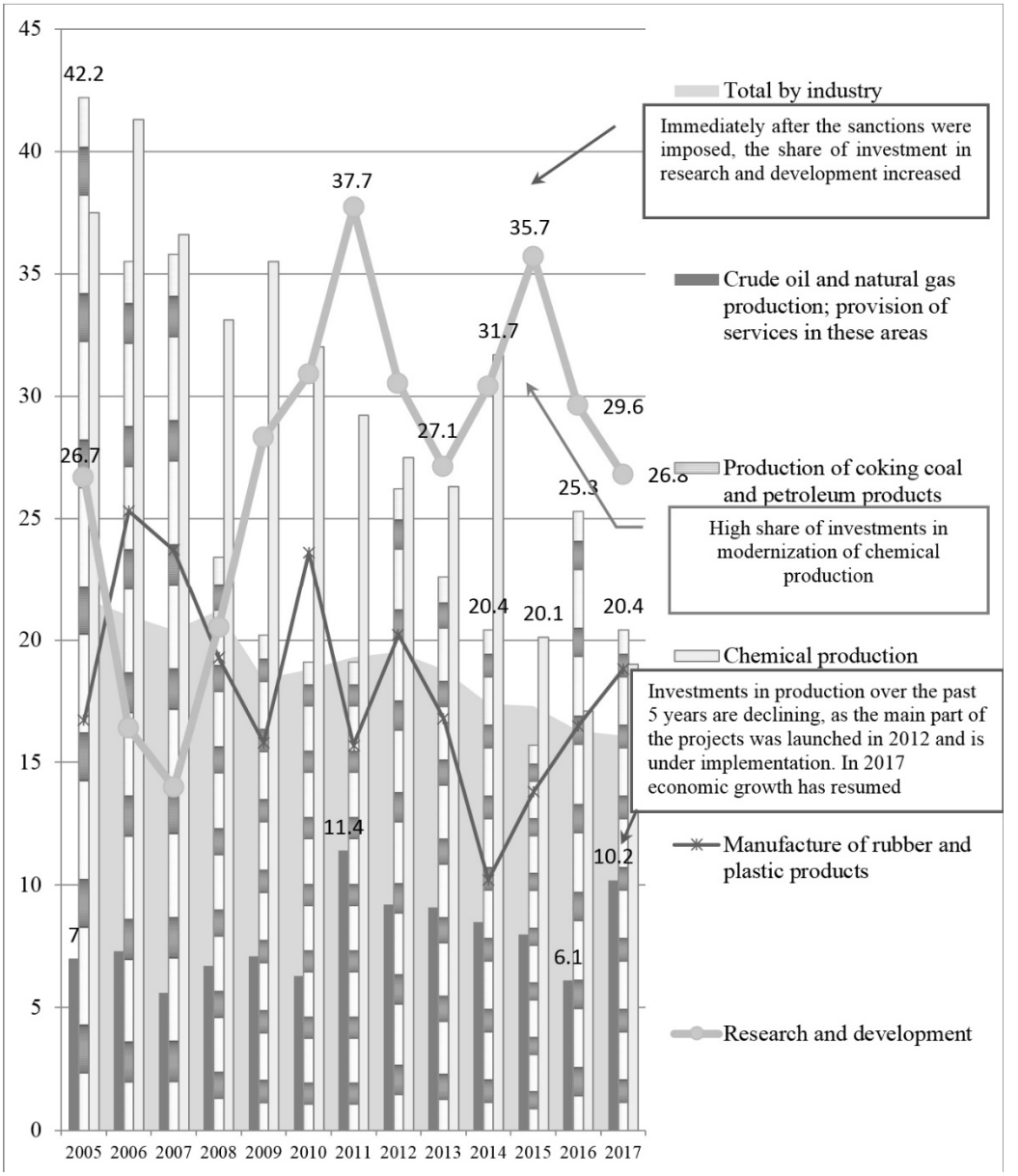

Figure 4 Share of investments aimed at reconstruction and modernization in 2005-2017, % of total investment in fixed assets in the Russian Federation
Source: The Federal state statistics service of the Russian Federation, n. d.

The increased growth of capital investments during the period of active deployment of sanctions in 2013-2014 suggests that the state and enterprises directed funds to the implementation of the strategy of diversification and deepening of petrochemical production. Positive dynamics of investments in research and development indicate the growing activity of Russian research centers and laboratories. Until 2014, the share of advanced technologies used in Russian industries was insignificant, ranging from 3 to 5%. In 2015, there was a sharp jump: due to the implementation of investment projects with the involvement of internal reserves of companies and targeted public funding, the number of technologies used in production increased tenfold.

If we analyze the dependence of import on the supply of technology, it can be noted that this trend continues, because the process of developing and commercializing of own scientific and practical developments is long and expensive. According to official data in 2015, in general, import of technologies prevailed over export in the fuel and energy sectors (figure 5).

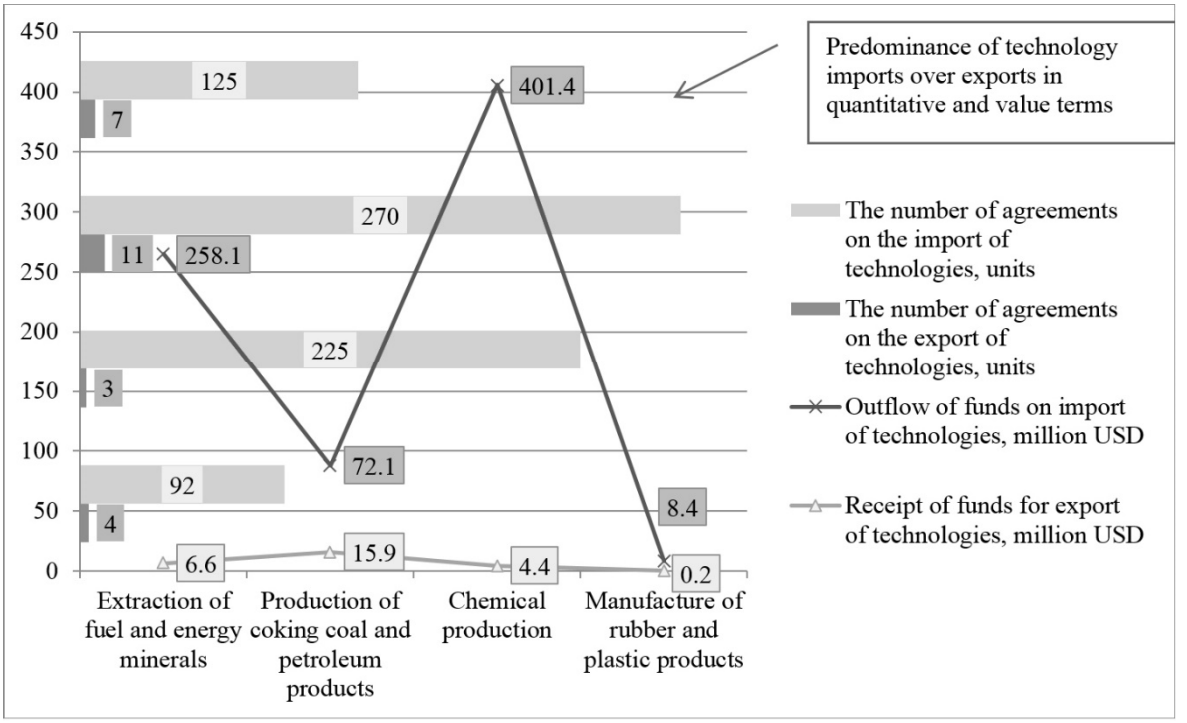

Figure 5 Ratio of export and import of technologies by branches of the fuel and energy complex of the Russian Federation in 2015
Source: Industrial production in Russia: statistical compendium, 2016.

Despite the positive dynamics of some indicators, the development of the domestic manufacturing industry is not yet consistent with the indicators of high technology. In order to achieve sustainable development in line with international standards and advanced achievements in science, Russian researchers must mobilize available resources to increase the innovative potential of all sectors of the manufacturing industry.

Conclusion

The study of the problems of technological integration in the manufacturing industry leads to the conclusion that from the point of view of scientific significance, the study conducted in the article will expand the existing approaches to the consideration of technological integration in enterprises of various sectors of the economy, will supplement the theory of organization with methodological provisions that reveal the essence and content of the conditions and factors of the dynamic process of technological integration.The obtained results allow giving a scientific substantiation of the methodology for the formation of the strategy of scientific and technological development of economic entities of various industries, taking into account the reflection and mitigation of external and internal technological challenges.

From the point of view of practical use of the obtained results, it is necessary to identify the development of a methodological approach to assessing the effectiveness of technological integration of manufacturing enterprises. This approach makes it possible to identify global trends and future challenges in the field of science and innovation, taking into account critical technologies and technological road routes for industrial enterprises, research centers and government agencies.

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References

Druzhinin, A. G.& Dong, Y. (2018).One Belt – One Road Initiative: A Window of Opportunity for Russia's Western Border Regions // *Baltic Region,*10 (2), 39 – 55.

https://doi.org/10.5922/2079-8555-2018-2-3 .

Gerasina, Yu. (2016).The impact of global transformation on function and dysfunction of management of economic reproduction process. *Economic system*, 1, 7-10.

https://elibrary.ru/download/elibrary_26688888_22465035.pdf

Grossman, T. (2018). The Rise of an Automated Jobless Society: Do Cutting-Edge Technologies Expel Workers Swifter than the Economy Can Identify New Jobs for Them?,*Psychosociological Issues in Human Resource Management,* 6(2), 62–67.https://doi.org/10.22381/PIHRM6220185

Hardingham, Eileen, Vrbka,Jaromír,Kliestik,Tomas &Kliestikova, Jana (2018). Will Cognitive Technology-Driven Automation Lead to Economic Growth?*Journal of Self-Governance and Management Economics,* 6(4),13–18.

https://doi.org/10.22381/JSME6420182

Industrial production in Russia*: statistical compendium*. (2016). Moscow: Rosstat.

Kovacs, O. (2018) The dark Corners of Industry 4.0 - Grounding Economic Governance 2.0 // *Technology in Society*,55, 140–145.

https://doi.org/10.1016/j.techsoc.2018.07.009 .

Mitea, Dana Raluca Elena (2018). The Expansion of Digitally Mediated Labor: Platform-Based Economy, Technology-Driven Shifts in Employment, and the Novel Modes of Service Work, *Journal of Self-Governance and Management Economics,* 6(4),7–13.

https://doi.org/10.22381/JSME6420181

Neary, Breda, Horák,Jakub,Kovacova,Maria&Valaskova, Katarina (2018). The Future of Work: Disruptive Business Practices, Technology-Driven Economic Growth, and Computer-Induced Job Displacement, *Journal of Self-Governance and Management Economics,* 6(4), 19–24.

https://doi.org/10.22381/JSME6420183

Nica, Elvira (2018). Will Robots Take the Jobs of Human Workers? Disruptive Technologies that May Bring About Jobless Growth and Enduring Mass Unemployment, *Psychosociological Issues in Human Resource Management,* 6(2), 56–61.

https://doi.org/10.22381/PIHRM6220184

Official website of the Ministry of Energy of the Russian Federation. Retrieved March 16, 2019.

https://minenergo.gov.ru/node/1212.

Oughton, E.J., Frias Z., Dohler M., Whalley J., Sicker D., Hall J.W., Crowcroft J., Cleevely D. D., Sicker Douglas, Hall Jim W., Crowcroft Jon, &Cleevely D. D. (2018). The strategic national infrastructure assessment of digital communications // *Digital Policy Regulation and Governance,* 20 (3), 197-210.

https://doi.org/10.1108/DPRG-02-2018-0004 .

Popescu, Gheorghe H., Petrescu, Irina Elena,Sabie,Oana Matilda, &Mușat, Mihaela (2018). Labor-Displacing Technological Change and Worldwide Economic Insecurity: How Automation and the Creation of Innovative Tasks Shape Inequality, *Psychosociological Issues in Human Resource Management,* 6(2), 80–85.

https://doi.org/10.22381/PIHRM6220188

Proskuryakova, L. (2017). Energy technology foresight in emerging economies. *Technological Forecasting and Social Change,* 119, 205 - 210. https://doi.org/10.1016/j.techfore.2016.05.024

The Federal state statistics service of the Russian Federation. *Investments in non-financial assets. Dynamics of investments in fixed assets* (in comparable prices) in the Russian Federation / Internet resource of the Federal state statistics service of the Russian Federation. Retrieved March 16, 2019.

http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/investment/nonfinancial/#.

The Federal state statistics service of the Russian Federation (n. d.). *Technological development of sectors of the economy*. Share of investments aimed at reconstruction and modernization in the total volume of investments in fixed assets by types of economic activity in the Russian Federation Retrieved March 16, 2019.

http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/economydevelopment/#..

The Ministry of Economic Development of Russia (2014, April 5) *About the approval of the State program of the Russian Federation "Energy Efficiency and Development of Power":* approved by the Order of the Government of the Russian Federation No. 321 (with changes and additions). Access from the Portal of state programs of the RF. Retrieved March 16, 2019.

http://programs.gov.ru/Portal/programs/passport/32 .

Vishnevskiy, K., Karasev, O., Meissner, D., Razheva, A., &Klubova, M. (2017). Technology foresight in asset intensive industries: the case of Russian shipbuilding. *Technological Forecasting and Social Change*. 119.

https://doi.org/10.1016/j.techfore.2016.05.001

Vochozka, Marek, Kliestik, Tomas,Kliestikova, Jana & Sion, Grațiela (2018). Participating in a Highly Automated Society: How Artificial Intelligence Disrupts the Job Market, *Economics, Management, and Financial Markets,*13(4), 57–62.

https://doi.org/10.22381/EMFM13420185

Wu, J., Harrigan, K. R., Ang, S. H., & Wu, Z. (2019). The impact of imitation strategy and R&D resources on incremental and radical innovation: evidence from Chinese manufacturing firms // *The Journal of Techology Transfer*, 44 (1), 210-230.

https://doi.org/10.1007/s10961-017-9621-9 .

Yao, Z., & Zhou, W. (2015). Vertical or Horizontal: Endogenous Merger Waves in Vertically Related Industries.*Journal of Economic Analysis & Policy,* 15 (3), 1237.

http://dx.doi.org/10.1515/bejeap-2014-0165

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Indicators of global university rankings: the theoretical issues

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Abstract
The main goal of this paper is to determine the significance of identified university ranking indicators in relation to the overall measurement system of selected global ranking systems. The realisation of the research was divided into two phases. The first phase consists of a systematic overview of the literature that has resulted in the identification of 16 global ranking systems. In the second phase, an empirical analysis of 10 active ranking systems which were selected based on the set criteria. The ranking systems are observed regarding their measurement focus. According to the results of empirical analysis, the research category indicators account for 67.93% of the sum of the weight coefficients in the overall measurement system, followed by the reputation category indicators with 13.5% and the web performance category indicators with 9.37%. The most significant number of global ranking systems dominantly puts its focus in the context of measuring research performance as the crucial indicator of the quality and competitiveness of universities.

Keywords
University, Global ranking System, Indicators

Introduction

The evolution of the global economy, accompanied by the transformation of the labor market (Chessell, 2018; Grossman, 2018) and the increasing level of human-machine collaboration (Bolton, Machová, Kovacova, & Valaskova, 2018), is fueling new educational and research trends that have significant impact on evaluation and the modification of the global higher education market. The knowledge economy becomes the basis for the development of the worldwide economy. Universities are beginning to emerge as complex organizational systems made up of a mix of complex technical and infrastructure solutions as a result of emerging global challenges. As a result of the massification of the higher education market, the emergence of an increasing number of universities has led to the development of global ranking systems. It is precisely the global ranking systems that set the criteria for defining the difference in the quality of research and higher education institutions. The primary purpose of such systems is to assist key stakeholders (students and parents, industry, media organizations, etc.) in selecting institutions whose characteristics will suit their preferences.

Global ranking systems do not represent a new phenomenon in measuring the position of a university, but only a "variation of the old idea of national ranking systems" (Usher & Savino, 2007, p. 6). Unlike national ranking systems, global systems approach university analysis using a set of indicators that are primarily and mainly focused on measuring the performance of the research process.

It can be noted that in the research of quality, similarity and difference, as well as the interconnection of individual global systems of university ranking and the related criteria, different methods and techniques of data analysis are used, according to analyzed relevant literature. Descriptive statistics are used to measure the central tendency (Çakır, Acartürk, Alaşehir, &

Çilingir, 2015; Khosrowjerdi & Kashani, 2013; Olcay & Bulu, 2017). When determining the strength of the relationship between the individual ranking systems and the indicators they use, the Spearman's correlation (Chen & Liao, 2012; Khosrowjerdi & Kashani, 2013; Moed, 2017; Shehatta & Mahmood, 2016) and Pearson's correlation were used (Claassen, 2015; Delgado-Márquez, Hurtado-Torres, & Bondar, 2011; Olcay & Bulu, 2017; Shehatta & Mahmood, 2016; Waltman et al., 2012).

The determination of the similarities between the individual ranking systems was carried out using the method of overlapping of the ranks (Aguillo, Bar-Ilan, Levene, & Jose Ortega, 2010; Olcay & Bulu, 2017), then the analysis of the inverse rank (Aguillo et al., 2010) as well as Spearman's footrule (Aguillo et al., 2010). The assessment of the quality dimensions of the global systems was carried out by the development of the factor model (Claassen, 2015), as well as the identification of the factor structure of the indicator to determine the impact of the identified factors on the overall score of the ranking system (Soh, 2015). In some comparative studies, the difference between the measurement systems was examined indicating the significance of certain indicator categories within the overall measurement system (Çakır et al., 2015; Olcay & Bulu, 2017; Vernon, Andrew Balas, & Momani, 2018).

In order to evaluate the usefulness of the ranking system and to identify opportunities for improving research performance, Vernon et al. (Vernon et al., 2018), by conducting a systematic review of literature, recognised 13 systems of university ranking, which form the basis of their research. Analysing the validity and sustainability of ranking system with respect to the indicators they contain, Vernon et al. (2018) conclude that it is necessary to make some improvements to the existing ranking system's methodologies, further suggesting that an ideal ranking system must reduce the proportion of weight coefficients for reputation measurement to be less than 10%. In the end, even though the authors stated that all selected systems represent ranking systems of universities, one of them does not seem to satisfy the characteristics of the ranking system. It is the "Carnegie Classification", a system that primarily has the role of a framework for the recognition and description of the university.

In a comparative study, Cakir et al. (2015) observe the indicators of global and national ranking systems from the aspect of the dimensions and categories to which they belong, the frequencies of specific categories within the measurement system, and the significance of the indicators according to the weight coefficients assigned to them. According to the results of the research, they conclude that national ranking systems are more focused on educational and institutional parameters, unlike global systems focusing primarily on measuring the research performance of the university.

Finally, of all the available research studies that are directed to comparative analysis of the ranking system (Çakır et al., 2015; Moed, 2017; Vernon et al., 2018), none gives an emphasis on determining the proportion of values of certain weight coefficients in the total system of evaluation of global ranking systems. Following the above, two research questions have identified in the paper:

RQ1: What indicators are used in the global ranking systems of universities?

RQ2: What is the difference in significance between different groups of indicators of the university ranking system?

Responding to the first raised research question requires the initial identification of the most important global ranking systems of universities in the relevant available literature and indicators used in them. Subsequently, based on the empirical data obtained from the selected studies, it is necessary to identify and analyse the ranking criteria and to perform the comparison, organisation and transformation of the weight coefficients of the identified criteria within the defined criteria groups in order to give a response to another research question. Finally, it is necessary to transform the weighted coefficients of the indicators to show their importance in the overall measurement system.

Accordingly, the main objective of the research is to determine the significance of the identified indicators related to the overall system of measurement of the selected global ranking systems of universities.

1. Methodology of research

In the realisation of the first phase of theoretical research, the method of literature analysis was used. It is a selected method of a systematic review of literature, which was carried out to identify the global ranking systems of the university in the relevant literature. The second phase of the research was conducted by the

empirical analysis of the active ranking systems identified within the first phase of the research.

1.1. A systematic review of the literature

The literature search was carried out according to the established working framework and guidelines (Kitchenham, 2004). A systematic review of the literature was preceded by the development of a protocol that included the definition of the goal of literature search, identification of keywords in the search, identification of the inclusive and exclusionary search terms, as well as the identification of the electronic databases for the search of scientific materials. In the end, all works identified in the search process are subject to evaluation through the criteria for evaluating scientific material.

The goal of the systematic literature search is to identify global ranking systems that have been the subject of comparative studies.

The search for scientific material lasted for three months and was completed in January 2018. The keywords used in the search are a combination of the following keywords: University, Ranking, Systems, "Higher Education", Indicators and Criteria. The search was carried out through the services of the Consortium of the Library of Serbia (KOBSON), and it included two major index databases and cited scientific materials (Aghaei Chadegani et al., 2013; Kivinen, Hedman, & Artukka, 2017; Vught & Westerheijden, 2010): SCOPUS and Web of Science (**WoS**).

The search criteria in the systematic review of literature were the type and domain of the study that is the subject of the research, the language of the available scientific material, the origins and years of its publication.

Including search criteria: Reviewed scientific and professional papers as well as final reports arising from the scientific-research projects; articles in the field of global ranking of universities; articles published in English or Serbian that meet defined keyword searches; articles published in the period 2007-2018.

Excluding search criteria: Articles based exclusively on the author's opinion. Also, in the case of articles related to the keywords relating to university ranking systems, it is necessary to exclude all articles in which they are placed outside the context of their comparison and classification.

The next step in the process of drafting a protocol for the implementation of a systematic review of the literature was to define the criteria for evaluating the quality of the identified scientific material. Criteria include the following questions: (1) The goal of the research is unambiguous? (2) Is the exploration method clearly explained? (3) Does the study point to empirical findings? (4) The results of the research have been thoroughly analysed? and (5) Is the study put in the context of other studies or research?

These criteria represent a customised version of the criteria listed in other studies (Kitchenham et al., 2009; Kofod-Petersen, 2014). Each evaluation criterion contains three possible answers (Kitchenham et al., 2009, p. 9): Y (Yes), P (Partial), and N (No), which are evaluated respectively by 1, ½ and 0. Answer Y (Yes) is a confirmation that the inclusion criterion is unambiguously contained in the study.

The results of the systematic overview of the literature are shown in Table 1.1. It contains data on the results of the search of scientific materials according to defined combinations of search terms in the title and the abstract for two selected index bases.

Table 1.1. Number of hits by search criteria

Combination of the search terms	WoS		SCOPUS	
	Title	Abstract	Title	Abstract
University AND Ranking AND Systems	26	1621	4	142
„Higher Education“ AND Ranking AND Systems	7	475	3	38
University AND Ranking AND (Indicators OR Criteria)	17	1369	3	117
„Higher Education“ AND Ranking AND (Indicators OR Criteria)	2	382	0	29

Source: The Authors

The literature search identified a total of 156 scientific publications and domains of global ranking systems of universities. The primary search identified 146 works, while secondary search included ten additional publications. Apache Open Office Calc, an application for tabular data processing, was used to keep records and encrypt the collected scientific material. Of the total number of collected articles, 25 were identified as redundant and were therefore removed, while the remaining number of publications were then subjected to checks based on pre-determined inclusion/exclusion criteria.

Table 1.2. An overview of the frequency of the analysis of the global ranking systems of universities in the selected literature

Global ranking systems for universities	Country	Year of publication of the first list	(Buela-Casal, Gutiérrez-Martínez, Bermúdez-Sánchez, & Vadillo-Muñoz, 2007)	(Aguillo, Bar-Ilan, Levene, & Jose Ortega, 2010)	(Çakır, Acartürk, Alaşehir, & Çilingir, 2015)	(Chen & Liao, 2012)	(Claassen, 2015)	(Marginson, 2014)	(Moed, 2017)	(Huang, 2011)	(Shehatta & Mahmood, 2016)	(Soh, 2015)	(Millot, 2015)	(Olcay & Bulu, 2017)	(Delgado-Márquez, Hurtado-Torres, & Bondar, 2011)	(Khosrowjerdi & Kashani, 2013)	(Waltman et al., 2012)	(Bornmann & Anegón, 2014)	(Vernon, Andrew Balas, & Momani, 2018)	Σ
			Authors																	
ARWU	China	2003	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	**16**
THE-QS	United Kingdom	2004	*	*						*					*					**4**
NTU	Taiwan	2007		*	*	*				*	*					*			*	**7**
CWTS	Netherlands	2007		*	*			*	*					*		*	*	*	*	**9**
THE WUR	United Kingdom	2010			*	*	*	*	*		*	*	*	*		*	*		*	**12**
SIR	Spain	2009			*			*									*	*	*	**5**
QS	United Kingdom	2010			*		*	*	*		*	*	*	*		*			*	**10**
URAP	Turkey	2010			*						*			*					*	**4**
WR	Spain	2004		*	*	*	*						*		*	*			*	**8**
UMR	Belgium	2014						*	*										*	**3**
CWUR	Saudi Arabia	2012					*												*	**2**
USN-GU	USA	2014					*				*								*	**3**
RUR	Russia	2010																	*	**1**
ABUR	Asia	1997	*																	**1**
CEST	Switzerland	1994	*																	**1**
CA	USA	2015																	*	**1**
U21	Australia	2012											*							**1**
Σ			**2**	**5**	**8**	**4**	**6**	**6**	**5**	**3**	**6**	**3**	**5**	**5**	**3**	**6**	**3**	2	13	

Note: GRU - Global ranking systems for universities; YoP – Year of Publish; ARWU - Academic Ranking of World Universities; THE-QS - The Times Higher Education - Quacquarelli Symonds; NTU - National Taiwan University Ranking; CWTS - Center for Science and Technology Studies; THE WUR - The Times Higher Education World University Rankings; SIR - SCImago Global Institutions Rankings; QS - Quacquarelli Symonds World University Ranking; URAP - University Ranking by Academic Performance; WR -Webometrics ranking; UMR - U-Multirank; CWUR - Center for World University Ranks in Saudi Arabia; USNGU-Best Global Universities US News & World Report; RUR - Round University Ranking; ABUR - Asia's best universities ranking; CEST - International Champions League of Research Institutions; CA - Clarivate Analytics Innovative University Ranking; U21 - Ranking of National Higher Education Systems;

Source: The Authors

The number of articles that passed the inclusion/exclusion criteria was reduced to 35. In the end, the last step was to evaluate the scientific material after which 17 articles were included in the systematic review of the literature.

The obtained literature search results show a list of 17 identified global ranking systems of universities. Basic information on ranking systems is given in Table 1.2.

According to the data presented in Table 1.2, it can be seen that the largest number of university ranking systems have been introduced by UK publishing houses (THE-QS, THE WUR, QS), Spain-based research organization (SIR and WR) and by private organization of the United States (USN- GU, CA). A single ranking system represents other countries.

2. The empirical analysis of the active ranking systems

The implementation of the empirical analysis of the university ranking system represents the second phase of the research process. This phase involved identifying all relevant information on ranking systems identified within the first phase of the research. Before the data were collected, each ranking system identified within the systematic review of the literature was evaluated based on the criteria shown in Table 2.1. Evaluation of the global ranking systems determined that five ranking systems do not meet the set criteria and are therefore excluded from the further analysis. According to the data in the accompanying table, RUR, CEST, ABUR, CA and CWUR systems represent the least significant rankings in the selected literature and the minimum number of information on the methodology of ranking.

Table 2.1. Criteria for the inclusion and exclusion of global ranking systems from empirical analysis

Inclusion criteria
▪ A global ranking system is recognized during the systematic overview of the literature ▪ The ranking system is placed in the context of other systems ▪ Basic information on the ranking system is available in the selected literature ▪ The ranking system is active in the last two years ▪ Information on ranking results is available on the global Internet.
Exclusion criteria
▪ The ranking system is exclusively focused on the ranking of only one study program ▪ National and regional ranking systems ▪ The ranking system is solely focused on measuring the position of a particular type of institution, not a university

Source: The Authors

The main reason for the exclusion of the THE-QS, ABUR and CEST system from the further analysis was their inactivity, while the lack of information in the available literature is the reason for omitting CWUR, RUR and CA systems. In the end, the reason for the exclusion of the U21 system is that this system doesn't rank universities, but it does rank the educational systems of countries in relation to the degree of their economic development (Millot, 2015).

3. Research results

In table 3.1 are shown the basic empirical information of the active global ranking systems selected by systematic literature review. Of all ranking systems, only UMR and CWTS systems do not base ranking results on a single score. With the highest number of ranking systems, lists of ranked institutions are published once during the year. Further, only the WR system generates lists of the best-ranked universities twice a year, which also contains the largest list with over 110,000 institutions. According to the basket of indicators, most of them contain a UMR system with a list of over 90 indicators, of which 35 indicators are used for measuring global performance.

According to analyses of the selected global ranking system, a total of 114 indicators were identified. In order to facilitate understanding of their purpose, some ranking systems (UMR, THWUR, SIR, CWTS) have joined the grouping of ranking indicators within the input and output dimensions adapted according to the working framework developed by Dill & Sua (Dill & Soo, 2005). A detailed analysis of each indicator required the collection of the necessary information on the description of the metrics used, the source of the data, the dimensions and categories to which it relates, the period on which the measurement is made, and the significance they have within each ranking system. After a detailed analysis of all the information collected for each of the identified indicators and the determination of the similarities and differences between them, the number of indicators was reduced to 68. The display of the regulated indicators has been shown in the table placed in the Appendix. In the same table are shown two ranking systems (CWTS and UMR) that don't use the weighted indicators.

Further, there are two groups of ranking systems that have a similar measurement focus. The first group are consists of NTU, URAP and CWTS ranking systems focused exclusively on the measurement of research performance of the university, while the second group are consists of

QS, THEWUR and UNS-GU ranking systems whose focus, in addition to research performance, is aimed to measure academic reputation. The narrowest focus has the NTU, URAP and CWTS ranking system which are exclusively focused on measuring research performance in the field of citation, scientific production and scientific excellence. Only SIR and WUR measure web performance of universities. Finally, there are three ranking systems (QS, UMR, THE-WUR) that, according to the input dimension of indicators, recognised international orientation (structure of staff and students) in the total measurement system.

Table 3.1. Basic information on selected global ranking systems for universities

System of ranking	Number of indicators	System version	List size	UR	RBF	FoP	CU	URL of the system of ranking
ARWU[1]	6	2017	500	Yes	Yes	Annually	No	http://www.shanghairanking.com/ARWU-Methodology-2017.html
THE WUR	13	2018	1000	Yes	Yes	Annually	No	https://www.timeshighereducation.com/world-university-rankings/methodology-world-university-rankings-2018
QS	6	2018	959	Yes	Yes	Annually	Yes	https://www.topuniversities.com/qs-world-university-rankings/methodology
NTU	8	2017	814	Yes	Yes	Annually	No	http://nturanking.lis.ntu.edu.tw/methodoloyg/sampleSelection
URAP	6	2017	2500	Yes	Yes	Annually	No	http://www.urapcenter.org/2016/methodology.php?q=1
WR	4	2018	11991	Yes	Yes	Semi-annual	No	http://www.webometrics.info/en/Methodology
USN-GU	13	2018	1250	Yes	Yes	Annually	No	https://www.usnews.com/education/best-global-universities/articles/methodology
SIR	12	2018	3234	Yes	Yes	Annually	Yes	https://www.scimagoir.com/methodology.php
UMR	35	2018	1600 +	No	Yes	Annually	Yes	http://www.umultirank.org/cms/category/methodology/
CWTS	11	2018	938	No	Yes	Annually	No	http://www.leidenranking.com/information/indicators

Note: FoP - Frequency of publication - CU - Comparison option of universities; RBF - Ranking by field; UR - unique rank;
Source: The Authors

4. Discussion of research results

The obtained results show that three ranking systems (URAP, CWTS, and NTU) are exclusively research-oriented and contain indicators that rely entirely on bibliometric sources of data. Similarly, ARWU, SIR and USN-GU are dominant research ranking systems.

In the case of the ARWU ranking, 90% of weight refers to measuring the quality of research and research performance. With slightly lower significance in the research measurement system, 75% of weighted indicators in the SIR and USN-GU systems have been directly related to the measurement of research performance. Furthermore, only three systems measure academic and research reputation (QS, THEWUR, USN-GU). Of this, the QS system of ranking assigns 50% significance to the indicator that measures the academic reputation of teaching and research, as well as the reputation of employers, while only 20% of weights refers to indicators directly measuring the research performance of the university (citation). Other indicators are related to the measurement of academic quality. Additionally, the measurement of academic quality has been recognized in addition to the QS system in three other global ranking systems. The ARWU contains indicators that measure the quality of students in terms of winning prizes (Nobel, Fields Medal) with 10% weight in the overall measurement score. On the other hand, THEWUR and UMR ranking systems measure a wider image of academic quality. Regarding the THEWUR ranking system, 33% of the total weighted indicators refer to the measurement of the reputation of teaching, staff structure, students, and learning environments as the initial characteristics of the university. Within the indicators that measure the research performance, results of the data analysis shown that the highest weight belongs to the indicators of research excellence: ARWU 70%, NTU 40%, URAP 39%, WUR 35% and USN-GU 32.5%. It should be noted that, in addition to the citation, researchers' excellence take into account indicators that measure a number of the most prestigious world awards (e.g. Nobel and Fields of Medals).

In addition to research excellence as a measure of the quality of research performance, the citation has recognized as a significant factor in the overall score of ranking results. Accordingly, citation rates as performance indicators have the highest importance in the URAP system with a share of total weighted scores of 36%, followed by the NTU system with 35% of the share of weighted scores attributed to the citation, THEWUR system with 30%, QS system with 20%, SIR system 13% of share, USN-GU system 17.5%, and WUR system with share of 10% of the weighted scores. In addition, scientific productivity measures as outcomes of the research results show presence in five ranking systems (NTU, SIR, THWUR, URAP, USN-GU). The largest sum of weighted coefficients of scientific productivity is identified within the NTU system and refers to 25% of the total weighted score of the ranked university, while only 5% of the total weighted score of the same subcategory occurs in the SIR ranking system. Finally, the indicators of collaboration (international, industry), as another critical aspect of the quality of research, have been identified in four ranking systems. The weight of the collaboration indicators in the URAP ranking system is 15% in the total score, within the USN-GU system is 10%, THEWUR system is 2.5%, and within the SIR system, it is only 2% of the significance.

Specific ranking systems measure the competitive position of the university from the aspect of innovation, transfer of knowledge and technology. It can be concluded that the UMR system attaches the most significant attention to the promotion of the quality of universities from the aspect of innovation development and technology transfer, as it includes indicators for measuring the approved patents, patents developed in cooperation with industry, launching start-ups and spin-off companies and measuring technological impacts (citation in the patents). Of all ranking systems, only the SIR system attaches a weight coefficient to the result indicators (5%) that measure the technological impact. On the other hand, the WUR ranking system gives only 2.5% weighted score to an indicator that measures the institutional income derived from the industry as a reflection of technology transfer.

Student mobility as an indicator of international orientation has recognised only within the UMR ranking system, while indicators that measure the visibility of universities on a global Internet network have been identified within the SIR and WR ranking systems. The overall weight of indicators for measuring the visibility of universities within the WR ranking system is 55%, while in the SIR system this share is lower and it is 20% of the total weight.

In table 4.1 are shown the ranking systems with information of the percentage of the share of the weighted indicators in relation to the total measurement system, according to subcategories, categories and dimensions of indicators. As mentioned earlier in this paper, only CWTS and UMR systems don't use weighted scores of university rank. It was only noted that their measure is covered by some of the categories noted in table 4.1. According to the obtained results, it can be concluded that the indicators of the output dimension have the highest share in the measurement system, with 93% of the total sum of the weight of all indicators. According to categories, the research indicators have the highest importance of total share of 67.93% with the overall measurement system. The value of the research category in the sum with the value of the category of "innovation, technology transfer and technological impact" reaches 68.87% share of total weight. The following is a category of reputation with a contribution of 13.5% in the overall weighted system, while 9.37% of share in total weight is related to indicators that measure the web performance of the university. The share of the other subcategories of the indicators is less than 4%. Of all indicator categories, the "student structure" category, which belongs to the dimension of entry, has the lowest share of 0.6% of the total weight of indicators.

In addition to the abovementioned, there are also different sources of data identified in the process of empirical analysis of the ranking system. They can all be viewed from the aspect of the database being used (e.g. WoS, SCOPUS, GSC); Institutions, offices or agencies that provide the necessary data for calculating scores (eg. patents offices, higher education institutions, national statistical data processing agencies, etc.); Data based on Internet sources (Majestic SEO, Ahref SEO, Yahoo Explorer, Google); and finally, the data obtained through the survey (reputation, satisfaction).

By a comparative analysis of the focus of measurement of the selected global ranking systems, and by identifying the most important areas of evaluation from the aspect of dimensions and categories of identified ranking criteria, an answer to the second research question was provided.

Table 4.1. The proportion of the weighted sum of indicators in the total measurement system

			Share of weighted coefficients of global ranking systems											
Dimension	**Category**	**Subcategory**	**(%) ARWU**	**CWTS**	**(%) NTU**	**(%) QS**	**(%) SIR**	**(%) THEWUR**	**UMR**	**(%) URAP**	**(%) UNS-GU**	**(%) WUR**	**∑(%) Ka**	**∑(%) Dm**
Input	Initial characteristics of the University	Group size	-		-	2.5	-	0.6		-	-	-	**3.69**	
		Study program and the number of position	-		-	0.6	-	-	*	-	-	-		
	Staff	Structure of staff	-		-	0.6	-	1.1	*	-	-	-	**1.69**	**7.0**
	Students	Structure of students	-		-	-	-	0.6	*	-	-	-	**0.60**	
	Financial resources	Revenues (total, ratio, development, research)	-		-	-	-	1.0	*	-	-	-	**1.04**	
Output	Graduated	Graduating on time	-		-	-	-	-	*	-	-	-	**0**	**93.0**
		Degrees awarded	-		-	-	-	-	*	-	-	-		
	Quality of education	Awards	**1.2**		-	-	-	-		-	-	-	**1.25**	
		Employment	-		-	-	-	-	*	-	-	-		
	Research	Publication (international collaborative publications, collaborative publication, articles, conferences)	2.5	*	3.1	-	1.5	1.1	*	3.1	3.1	-	**67.93**	
		Citations	-	*	4.4	2.5	1.6	3.7	*	4.5	2.2	1.2		
		Research excellence	8.7	*	5.0	-	6.2	-	*	4.9	4.1	4.4		
	Innovation, technology transfer and technology impact	Intellectual property rights	-		-	-	-	-	*	-	-	-	**0.94**	
		Technology transfer	-		-	-	-	0.3	*	-	-	-		
		Technology impact	-		-	-	0.6	-	*	-	-	-		
	Reputation	Academic reputation (research, teaching)	-		-	5.0	-	4.1		-	3.1	-	**13.50**	
		Employer reputation	-		-	1.2	-	-		-	-	-		
	International collaboration	Mobility	-		-	-	-	-	*	-	-	-	**0**	
	Web performance	Web performance	-		-	-	2.5	-		-	-	6.9	**9.37**	
		∑(%)	12.5	-	12.5	12.5	12.5	12.5	-	12.5	12.5	12.5		**100**

Note: Ka - category; Dm - dimension;
Source: The Authors

5. Concluding remarks

Numerous indicators of global ranking systems of universities have been identified in this paper. A detailed analysis of the ranking system is presented according to the focus of their measurement based on the identified indicators. According to the obtained results, the most significant similarity is observed between the NTU, URAP and CWTS ranking systems, since they are systems which rely exclusively on bibliometric data sources and use the same data sources (WoS) for determining values by indicators.

The most significant number of global ranking systems dominantly puts its focus in the context of measuring research performance as the crucial indicator of the quality and competitiveness of universities. There are certain standpoints regarding the perception of the research performance. Thus, Vernon et al. (2018) observe the research performance from the aspect of citation, scientific productivity and innovation.

In the context of the measurement scale of the ranking system within this comparative study, the research performance was observed from two aspects. On the one hand, as a measure of citation, scientific production and scientific excellence (ARWU, THE WUR, QS, NTU, URAP, WR, USN-GU, SIR , UMR, CWTS), and on the other hand as a measure of innovation, technology transfer and technological impact (THEWUR, SIR, UMR) as a result of scientific research. Additionally, the global ranking systems of the

university point out some of the academic quality measures as a focus of measurement, where the focus is on reputation measurement (QS, THEWUR, UNS-GU) and the quality of teaching and learning environment (THE WUR). Also, the initial characteristics of the institution are an essential indicator of quality. Thus, QS and THEWUR, as an essential measure of the initial characteristics, emphasise the study programs and the number of places in study programs, as well as monitoring the relationship between the number of students and staff. Finally, the focus of measurement of the observed ranking systems is also the domain of the university's international orientation in terms of student mobility and staffing (UMR), as well as the focus on measuring web performance (SIR, WR) of the university through link analysis.

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References

Aghaei Chadegani, A., Salehi, H., Md Yunus, M. M., Farhadi, H., Fooladi, M., Farhadi, M., & Ale Ebrahim, N. (2013). A comparison between two main academic literature collections: Web of Science and Scopus databases. *Asian Social Science, 9* (5), 18-26. https://doi.org/10.5539/ass.v9n5p18

Aguillo, I. F., Bar-Ilan, J., Levene, M., & Jose Ortega, L. (2010). Comparing university rankings. *Scientometrics, 85* (1), 243-256. https://doi.org/10.1007/s11192-010-0190-z

Bolton, C., Machová, V., Kovacova, M., & Valaskova, K. (2018). The Power of Human-Machine Collaboration: Artificial Intelligence, Business Automation, and the Smart Economy. *Economics, Management, and Financial Markets, 13* (4), 51-56. https://doi.org/10.22381/EMFM13420184

Bornmann, L., & Anegón, F. de M. (2014). What Proportion of Excellent Papers Makes an Institution One of the Best Worldwide? Specifying Thresholds for the Interpretation of the Results of the SCImago Institutions Ranking and the Leiden Ranking. *Journal of the Association for Information Science & Technology, 65* (4), 732-736. https://doi.org/10.1002/asi.23047

Buela-Casal, G., Gutiérrez-Martínez, O., Bermúdez-Sánchez, M. P., & Vadillo-Muñoz, O. (2007). Comparative study of international academic rankings of universities. *Scientometrics, 71* (3), 349-365. https://doi.org/10.1007/s11192-007-1653-8

Çakır, M. P., Acartürk, C., Alaşehir, O., & Çilingir, C. (2015). A comparative analysis of global and national university ranking systems. *Scientometrics, 103* (3), 813-848. https://doi.org/10.1007/s11192-015-1586-6

Chen, K. hua, & Liao, P. yu. (2012). A comparative study on world university rankings: A bibliometric survey. *Scientometrics, 92* (1), 89-103. https://doi.org/10.1007/s11192-012-0724-7

Chessell, D. (2018). The Jobless Economy in a Post-Work Society: How Automation Will Transform the Labor Market. *Psychosociological Issues in Human Resource Management, 2* (6), 74-79.

https://doi.org/10.22381/PIHRM6220187

Claassen, C. (2015). Measuring university quality. *Scientometrics, (April)*, 793-807. https://doi.org/10.1007/s11192-015-1584-8

Delgado-Márquez, B. L., Hurtado-Torres, N. E., & Bondar, Y. (2011). Internationalization of Higher Education: Theoretical and Empirical Investigation of Its Influence on University Institution Rankings. *Revista de Universidad y Sociedad Del Conocimiento, 8* (2), 265-284. https://doi.org/10.7238/rusc.v8i2.1069

Dill, D. D., & Soo, M. (2005). Academic quality, league tables, and public policy: A cross-national analysis of university ranking systems. *Higher Education, 49* (4), 495-533. https://doi.org/10.1007/s10734-004-1746-8

Grossman, T. (2018). The Rise of an Automated Jobless Society: Do Cutting-Edge Technologies Expel Workers Swifter than the Economy Can Identify New Jobs for Them? Psychosociological *Issues in Human Resource Management, 6* (2), 62-67. https://doi.org/10.22381/PIHRM6220185

Huang, M.-H. (2011). A Comparison of Three Major Academic Rankings for World Universities: From a Research Evaluation Perspective. *Journal of Library and Information Studies, 9* (1), 1-25. https://doi.org/10.1023/A:1021225514599

Khosrowjerdi, M., & Kashani, Z. S. (2013). *Asian top universities in six world university ranking systems. Webology*, *10* (2), 1-9. Retrieved April, 18, 2019 from: http://www.webology.org/2013/v10n2/a114.pdf

Kitchenham, B. (2004). *Procedures for performing systematic reviews*. In Keele, UK, Keele University. Retrieved April, 18, 2019 from: https://pdfs.semanticscholar.org/d36f/e9d7839596d58fa008121db57dc7cadda338.pdf

Kitchenham, B., Pearl Brereton, O., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering - A systematic literature review. *Information and Software Technology, 51* (1), 7-15. https://doi.org/10.1016/j.infsof.2008.09.009

Kivinen, O., Hedman, J., & Artukka, K. (2017). Scientific publishing and global university rankings. How well are top publishing universities recognized? *Scientometrics, 112* (1), 679-695. https://doi.org/10.1007/s11192-017-2403-1

Kofod-Petersen, A. (2014). How to do a Structured Literature Review in computer science. Retrieved April, 18, 2019 from: https://www.researchgate.net/publication/265158913_How_to_do_a_Structured_Literature_Review_in_computer_science

Marginson, S. (2014). University rankings and social science. *European Journal of Education, 49* (1), 45-59. https://doi.org/10.1111/ejed.12061

Millot, B. (2015). International rankings: Universities vs. higher education systems. International Journal of Educational Development, 40, 156-165. https://doi.org/10.1016/j.ijedudev.2014.10.004

Moed, H. F. (2017). A critical comparative analysis of five world university rankings. *Scientometrics, 129* (2), 1-24. https://doi.org/10.1007/s11192-016-2212-y

Olcay, G. A., & Bulu, M. (2017). Is measuring the knowledge creation of universities possible?: A review of university rankings. *Technological Forecasting and Social Change, 123*, 153-160. https://doi.org/10.1016/j.techfore.2016.03.029

Shehatta, I., & Mahmood, K. (2016). Correlation among top 100 universities in the major six global rankings: policy implications. *Scientometrics, 109* (2), 1231-1254. https://doi.org/10.1007/s11192-016-2065-4

Soh, K. (2015). What the Overall doesn't tell about world university rankings: examples from ARWU, QSWUR, and THEWUR in 2013. *Journal of Higher Education Policy and Management, 37* (3), 295-307. https://doi.org/10.1080/1360080X.2015.1035523

Usher, A., & Savino, M. (2007). A global survey of university ranking and league tables. *Higher Education in Europe, 32* (1), 5-15. https://doi.org/10.1080/03797720701618831

Vernon, M. M., Andrew Balas, E., & Momani, S. (2018). Are university rankings useful to improve research? *A systematic review. PLoS ONE, 13* (3), 1-15. https://doi.org/10.1371/journal.pone.0193762

Vught, F. A. van, & Westerheijden, D. F. (2010). Multidimensional ranking: a new transparency tool for higher education and research. *Higher Education Management and Policy, 22* (3), 1-26. https://doi.org/10.1787/hemp-22-5km32wkjhf24

Waltman, L., Calero-medina, C., Kosten, J., Noyons, E. C. M., Tijssen, R. J. W., Eck, N. J. Van, … Wouters, P. (2012). The Leiden Ranking 2011/2012: Data collection, indicators, and interpretation. *Journal of the Association for Information Science and Technology, 63* (12), 2419-2432. https://doi.org/10.1002/asi.22708

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Appendix

Indicators of 10 global ranking systems

Subcategory	Indicators of ranking results	Normalisation of indicators	Data source	Period (years)	Global ranking systems									
					ARWU	CWTS	NTU	QS	SIR	THE WUR	UMR	URAP	USN -GU	WUR
Study program and the number of position	Foreign language BA programs		Institution								+			
Study program and the number of position	Foreign language MA programs		Institution								+			
Study program and the number of position	Post-doc positions		Institution								+			
Group size	Student-to-faculty ratio		Institution					20.0%		4.5%				
Structure of staff	International faculty		Institution					5.0%			+			
Structure of staff	Doctorates awarded-to-academic staff Ratio		Institution							6.0%				
Structure of staff	International-to-domestic-staff ratio		Institution							2.5%				
Structure of students	international student ratio		Institution					5.0%						
Structure of students	International-to-domestic-student ratio		Institution							2.5%				
Structure of students	Doctorate-to-bachelor's ratio		Institution							2.3%				
Revenues ratio	Research income/academic staff	Fields	Institution	-						6.0%	+			
Revenues from research	Income from private sources		Institution								+			
Revenues from development	Income from continuous professional development (CPD)		Institution								+			
Revenues total	Institutional income	Purchasing power	Institution	-						2.3%	+			
Degrees awarded	International doctorate degrees		Institution								+			
Degrees awarded	BA graduation rate		Institution								+			
Degrees awarded	MA graduation rate		Institution								+			
Graduation time	Graduating on time (bachelors)		Institution								+			
Graduation time	Graduating on time (masters)		Institution								+			
Awards	Alumni of an institution winning Nobel Prizes and Fields Medals (alumni)		Nobel prize, Mathunion		10.0%									
Employment	BA graduates working in the region		Alumni								+			
Employment	Student internships in the region										+			
Employment	MA graduates working in the region		Alumni								+			
Citations	The average number of citation	Field, Year of publication	WoS	11		+	10.0%							
Citations	Number of citations	Year, Field, Number of publications,	WoS, SCOPUS, Google Scholar Citations	2, 11,5,3			25.0%	20.0%		30.0%		21.0%	7.5%	10.0%
Citations	Normalized Impact	Field, Year	WoS, SCOPUS	3					13.0%			15.0%	10.0%	
Citations	Citation rate	Field, Year of publication	WoS	4										
Research excellence	The staff of an institution winning Nobel Prizes and Fields Medals		Nobel prize, Mathunion		20.0%									
Research excellence	Per-capita				10.0%									
Research excellence	Papers indexed in Science Citation Index-Expanded and Social Science Citation Index		WoS (InCites)	1, 5	20.0%							21.0%		
Research excellence	Highly cited researchers		WoS	1	20.0%									
Research excellence	Number and Proportion of top 1% publications	Field, Year	WoS	11		+	15.0%						10.0%	
Research excellence	Number and Proportion of top 10% publications	Field, Year	WoS, SCOPUS			+			2.0%		+		22.5%	35.0%

Subcategory	Indicators of ranking results	Normalisation of indicators	Data source	Period (years)	Global ranking systems									
					ARWU	CWTS	NTU	QS	SIR	THE WUR	UMR	URAP	USN -GU	WUR
Research excellence	Number and Proportion of top 5% publications	Field, Year	WoS			+								
Research excellence	Number and Proportion of top 50% publications	Field, Year	WoS			+								
Research excellence	Number of articles in the current year in high-impact journals		WoS (JCR), SCOPUS	Current Year			15.0%		8.0%					
Research excellence	h-index		WoS (SCI i SSCI)	2			10.0%							
Research excellence	High-Quality Publications		SCOPUS						2.0%					
Research excellence	Publications cited in patents		PATSTAT						25.0%					
Research excellence	Excellence with Leadership		SCOPUS						13.0%					
Research excellence	Article Impact Total	Field, Year	WoS (InCites)									18.0%		
Publications	Proportion collaborative publications		WoS			+								
Publications	Proportion long distance collaborative publications		WoS			+					+			
Publications	Interdisciplinary publications										+			
Publications	Papers published in Nature and Science		WoS	5	20.0%									
Publications	Proportion industry collaborative publications		WoS			+					+			
Publications	Proportion international collaborative publications		WoS (inCites)	3,		+			2.0%	2.5%	+	15.0%	10.0%	
Publications	Number of articles	Subject, size	WoS, SCOPUS	Current Year, 11			25.0%		5.0%	6.0%		10.0%	10.0%	
Publications	Scientific talent pool		SCOPUS						5.0%					
Publications	Art related output										+			
Publications	Professional publications										+			
Publications	Books (supplements of research publications)												2.5%	
Publications	Conference articles										+		2.5%	
Patents	Patents awarded		EPO, USPTO								+			
Patents	Industry co-patents		EPO, USPTO								+			
Spin-offs	Spin-off										+			
Technology impact	Technological Impact (TI)		PATSTAT						5.0%					
Technology impact	Publications cited in patents		PATSTAT								+			
Transfer of technology	Industry income (knowledge transfer)		Institutions							2.5%				
Employment	Graduate companies										+			
Academic reputation	Academic reputation		Survey					40.0%						
Academic reputation	Reputation survey		Survey	1						15.0%				
Academic reputation	Reputation survey (research)		Survey							18.0%			25.0%	
Reputation - employers	Employer reputation		Survey					10.0%						
Mobility of students	Student mobility										+			
Web performance	Web size (backlinks of institutions web page)		Google						5.0%					5.0%
Web performance	Number of the web pages (Visibility)		Afres, Majestic						15.0%					50.0%
Other	Strategic research partnerships in the region		Institutions								+			
					100%	-	100%	100%	100%	100%	-	100%	100%	100%

Source: Authors

Note: Table form has adapted from Vernon et al. (2018)

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A paper must be written in text processor Microsoft Word. Paper size: A4. Margins: 3.0 cm on top and bottom, and 2.5 cm on left and right sides. As a guide, articles should be no more than 5.000 words in length. In case the paper exceeds the normal length, the Editors' consent for its publication is needed. Articles submitted for publication in Journal should include the research aim and tasks, with detailed methodology, presenting literature overview on the research object, substantiation of the achieved results and findings, conclusions and a list of references. Manuscripts should be arranged in the following order of presentation.

First page: Title (no more that 10 words), subtitle (if any), autobiographical note (the author's full name, academic affiliation, telephone, fax and e-mail address and full international contact). Respective affiliations and addresses of co-authors should be clearly indicated. Please also include approximately 50 words of biographical information on each author of the submitted paper.

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- A self-contained abstract/summary/resume of up to 150 words, describing the research objective and its conclusions
- Up to ten keywords, which encapsulate the principal subjects covered by the article; and
- A self-contained summary of up to 200 words, describing the article and its conclusions.

Subsequent pages: Main body of the text with headings, footnotes, a list of references, appendices, tables and illustrations. The paragraph parameters are:

- Font: Times New Roman, 10 pt, regular
- Spacing: Before: 0, After: 0
- Line Spacing: Single
- Alignment: Justified
- Indentation: Left: 0, Right: 0, Special: 0.
- Style: Normal (**not Title, Heading1, Heading2,...,Body Text, etc!**)

Leave an empty line between paragraphs.

Headings: Headings must be short, clearly defined and numbered, except for Introduction and Conclusions. Apply at most three levels of headings. Please, leave two empty lines before headings and one empty line after. Font: Times New Roman, bold, 16 pt, centered.
Section headings should be in **bold** with Leading Capitals on Main Words, Times New Roman, 14pt, bold, centered.
Sub-section headings should be in *italics*, with Leading Capitals on Main Words, Times New Roman, 12 pt, bold.

All tables, graphs and diagrams are expected to back your research findings. They should be clearly referred to and numbered consecutively in Arabic numerals. They should be placed in the text at the appropriate paragraph (just after its reference).

Tables should be centered. All tables must have captions. The title of your table should follow the table number. Tables should not be wider than the margins of the paper. Skip two lines before and after each table.

Figures should be centered. All figures must have captions. The title of figures should appear immediately below the figure. The title of the figure should follow the figure number. Figures should not be wider than the margins of the paper. Skip two lines before and after each figure. Figures will not be redrawn by the publisher. Figures should be high-quality **grayscale** graphics (please, do not use colors): vector drawings (with text converted to curves) or 300 dpi bitmaps. Please do not supply any graphics copied from a website, as the resolution will be too low. In all figures taken or adapted from other sources, a brief note to that effect is obligatory, below the figure. One sentence at least referring to the illustration is obligatory.

Mathematical expressions should be numbered on the right side, while all variables and parameters must be defined.

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Authors are responsible for ensuring that all manuscripts (whether original or revised) are accurately typed before final submission. One set of proof will be sent to authors, if requested, before the final publication, which must be returned promptly.

Referencing Guide

The references should specify the source (such as book, journal article or a web page) in sufficient detail to enable the readers to identify and consult it. The references are placed at the end of the work, with sources listed alphabetically (a) by authors' surnames or (b) by the titles of the sources (if the author is unknown). Multiple entries by the same author(s) must be sequenced chronologically, starting from the earliest, e.g.:

Ljubojević, T.K. (1998).
Ljubojević, T.K. (2000a).
Ljubojević, T.K. (2000b).
Ljubojević, T.K., & Dimitrijević, N.N. (1994).

Here is a list of the most common reference types:

A. PERIODICALS

Authors must be listed by their last names, followed by initials. Publication year must be written in parentheses, followed by a full stop. Title of the article must be in sentences case: only the first word and proper nouns in the title are capitalized. The periodical title must be in title case, followed by the volume number, which is also italicized:

Author, A. A., Author, B. B., & Author, C. C. (Year). Title of article. *Title of Periodical, volume number*(issue number), pages.

➲ Journal article, one author, paginated by issue

Journals paginated by issue begin with page 1 in every issue, so that the issue number is indicated in parentheses after the volume. The parentheses and issue numbers are not italicized, e.g.

Tanasijević, V. (2007). A PHP project test-driven end to end. *Management Information Systems, 5* (1), 26-35.

➲ Journal article, one author, paginated by volume

Journals paginated by volume begin with page 1 in issue 1, and continue page numbering in issue 2 where issue 1 ended, e.g.

Perić, O. (2006). Bridging the gap: Complex adaptive knowledge management. *Strategic Management, 14*, 654-668.

➲ **Journal article, two authors, paginated by issue**

Strakić, F., & Mirković, D. (2006). The role of the user in the software development life cycle. *Management Information Systems, 4* (2), 60-72.

➲ **Journal article, two authors, paginated by volume**

Ljubojević, K., & Dimitrijević, M. (2007). Choosing your CRM strategy. *Strategic Management, 15*, 333-349.

➲ **Journal article, three to six authors, paginated by issue**

Jovanov, N., Boškov, T., & Strakić, F. (2007). Data warehouse architecture. *Management Information Systems, 5* (2), 41-49.

➲ **Journal article, three to six authors, paginated by volume**

Boškov, T., Ljubojević, K., & Tanasijević, V. (2005). A new approach to CRM. *Strategic Management, 13*, 300-310.

➲ **Journal article, more than six authors, paginated by issue**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., et al. (2005). Putting the user at the center of software testing activity. *Management Information Systems, 3* (1), 99-106.

➲ **Journal article, more than six authors, paginated by volume**

Strakić, F., Mirković, D., Boškov, T., Ljubojević, K., Tanasijević, V., Dimitrijević, M., et al. (2003). Metadata in data warehouse. *Strategic Management, 11*, 122-132.

➲ **Magazine article**

Strakić, F. (2005, October 15). Remembering users with cookies. *IT Review*, *130*, 20-21.

➲ **Newsletter article with author**

Dimitrijević, M. (2009, September). MySql server, writing library files. *Computing News, 57,* 10-12.

➲ **Newsletter article without author**

VBScript with active server pages. (2009, September). *Computing News,57,* 21-22.

B. BOOKS, BROCHURES, BOOK CHAPTERS, ENCYCLOPEDIA ENTRIES, AND BOOK REVIEWS

Basic format for books

Author, A. A. (Year of publication). *Title of work: Capital letter also for subtitle*. Location: Publisher.

Note: "Location" always refers to the town/city, but you should also include the state/country if the town/city could be mistaken for one in another country.

➲ **Book, one author**

Ljubojević, K. (2005). *Prototyping the interface design*. Subotica: Faculty of Economics.

➲ **Book, one author, new edition**

Dimitrijević, M. (2007). *Customer relationship management* (6th ed.). Subotica: Faculty of Economics.

➲ **Book, two authors**

Ljubojević, K., Dimitrijević, M. (2007). *The enterprise knowledge portal and its architecture*. Subotica: Faculty of Economics.

➲ **Book, three to six authors**

Ljubojević, K., Dimitrijević, M., Mirković, D., Tanasijević, V., & Perić, O. (2006). *Importance of software testing*. Subotica: Faculty of Economics.

➲ **Book, more than six authors**

Mirković, D., Tanasijević, V., Perić, O., Jovanov, N., Boškov, T., Strakić, F., et al. (2007). *Supply chain management*. Subotica: Faculty of Economics.

➲ **Book, no author or editor**

Web user interface (10th ed.). (2003). Subotica: Faculty of Economics.

➲ **Group, corporate, or government author**

Statistical office of the Republic of Serbia. (1978). *Statistical abstract of the Republic of Serbia*. Belgrade: Ministry of community and social services.

➲ **Edited book**

Dimitrijević, M., & Tanasijević, V. (Eds.). (2004). *Data warehouse architecture*. Subotica: Faculty of Economics.

➲ **Chapter in an edited book**

Boškov, T., & Strakić. F. (2008). Bridging the gap: Complex adaptive knowledge management. In T. Boškov & V. Tanasijević (Eds.), *The enterprise knowledge portal and its architecture* (pp. 55-89). Subotica: Faculty of Economics.

➲ **Encyclopedia entry**

Mirković, D. (2006). History and the world of mathematicians. In *The new mathematics encyclopedia* (Vol. 56, pp. 23-45). Subotica: Faculty of Economics.

C. UNPUBLISHED WORKS

➲ **Paper presented at a meeting or a conference**

Ljubojević, K., Tanasijević, V., Dimitrijević, M. (2003). *Designing a web form without tables*. Paper presented at the annual meeting of the Serbian computer alliance, Beograd.

➲ **Paper or manuscript**

Boškov, T., Strakić, F., Ljubojević, K., Dimitrijević, M., & Perić, O. (2007. May). *First steps in visual basic for applications*. Unpublished paper, Faculty of Economics Subotica, Subotica.

➲ **Doctoral dissertation**

Strakić, F. (2000). *Managing network services: Managing DNS servers*. Unpublished doctoral dissertation, Faculty of Economics Subotica, Subotica.

➲ **Master's thesis**

Dimitrijević, M. (2003). *Structural modeling: Class and object diagrams*. Unpublished master's thesis, Faculty of Economics Subotica, Subotica.

D. ELECTRONIC MEDIA

The same guidelines apply for online articles as for printed articles. All the information that the online host makes available must be listed, including an issue number in parentheses:

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Online Periodical, volume number*(issue number if available). Retrieved from http://www.anyaddress.com/full/url/

➲ **Article in an internet-only journal**

Tanasijević, V. (2003, March). Putting the user at the center of software testing activity. *Strategic Management*, *8* (4). Retrieved October 7, 2004, from www.ef.uns.ac.rs/sm2003

➲ **Document from an organization**

Faculty of Economics. (2008, March 5). *A new approach to CRM*. Retrieved July 25, 2008, from http://www.ef.uns.ac.rs/papers/acrm.html

➲ **Article from an online periodical with DOI assigned**

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. doi: 10.1108/06070565717821898.

➲ **Article from an online periodical without DOI assigned**

Online journal articles without a DOI require a URL.

Author, A. A., & Author, B. B. (Publication date). Title of article. *Title of Journal, volume number*. Retrieved from http://www.anyaddress.com/full/url/

Jovanov, N., & Boškov, T. A PHP project test-driven end to end. *Management Information Systems*, 2 (2), 45-54. Retrieved from http://www.ef.uns.ac.rs/mis/TestDriven.html.

REFERENCE QUOTATIONS IN THE TEXT

➲ **Quotations**

If a work is directly quoted from, then the author, year of publication and the page reference (preceded by "p.") must be included. The quotation is introduced with an introductory phrase including the author's last name followed by publication date in parentheses.

According to Mirković (2001), "The use of data warehouses may be limited, especially if they contain confidential data" (p. 201).

> Mirković (2001), found that "the use of data warehouses may be limited" (p. 201). What unexpected impact does this have on the range of availability?

If the author is not named in the introductory phrase, the author's last name, publication year, and the page number in parentheses must be placed at the end of the quotation, e.g.

> He stated, "The use of data warehouses may be limited," but he did not fully explain the possible impact (Mirković, 2001, p. 201).

➲ **Summary or paraphrase**

> According to Mirković (1991), limitations on the use of databases can be external and software-based, or temporary and even discretion-based. (p.201)

> Limitations on the use of databases can be external and software-based, or temporary and even discretion-based (Mirković, 1991, p. 201).

➲ **One author**

> Boškov (2005) compared the access range…
>
> In an early study of access range (Boškov, 2005), it was found...

➲ When there are **two authors**, both names are always cited:

> Another study (Mirković & Boškov, 2006) concluded that…

➲ If there are **three to five authors**, all authors must be cited the first time. For subsequent references, the first author's name will cited, followed by "et al.".

> (Jovanov, Boškov, Perić, Boškov, & Strakić, 2004).

In subsequent citations, only the first author's name is used, followed by "et al." in the introductory phrase or in parentheses:

> According to Jovanov et al. (2004), further occurences of the phenomenon tend to receive a much wider media coverage.
>
> Further occurences of the phenomenon tend to receive a much wider media coverage (Jovanov et al., 2004).

In "et al.", "et" is not followed by a full stop.

➲ **Six or more authors**

The first author's last name followed by "et al." is used in the introductory phrase or in parentheses:

> Yossarian et al. (2004) argued that…
>
> … not relevant (Yossarian et al., 2001).

➲ **Unknown author**

If the work does not have an author, the source is cited by its title in the introductory phrase, or the first 1-2 words are placed in the parentheses. Book and report titles must be italicized or underlined, while titles of articles and chapters are placed in quotation marks:

> A similar survey was conducted on a number of organizations employing database managers ("Limiting database access", 2005).

If work (such as a newspaper editorial) has no author, the first few words of the title are cited, followed by the year:

> ("The Objectives of Access Delegation," 2007)

Note: In the rare cases when the word "Anonymous" is used for the author, it is treated as the author's name (Anonymous, 2008). The name Anonymous must then be used as the author in the reference list.

➲ **Organization as an Author**

If the author is an organization or a government agency, the organization must be mentioned in the introductory phrase or in the parenthetical citation the first time the source is cited:

> According to the Statistical Office of the Republic of Serbia (1978), …

Also, the full name of corporate authors must be listed in the first reference, with an abbreviation in brackets. The abbreviated name will then be used for subsequent references:

> The overview is limited to towns with 10,000 inhabitants and up (Statistical Office of the Republic of Serbia [SORS], 1978).

> The list does not include schools that were listed as closed down in the previous statistical overview (SORS, 1978).

➲ When citing **more than one reference from the same author**:

> (Bezjak, 1999, 2002)

➲ When several **used works by the same author were published in the same year**, they must be cited adding a, b, c, and so on, to the publication date:

> (Griffith, 2002a, 2002b, 2004)

➲ **Two or more works in the same parentheses**

When two or more works are cited parenthetically, they must be cited in the same order as they appear in the reference list, separated by a semicolon.

> (Bezjak, 1999; Griffith, 2004)

➲ **Two or more works by the same author in the same year**

If two or more sources used in the submission were published by the same author in the same year, the entries in the reference list must be ordered using lower-case letters (a, b, c…) with the year. Lower-case letters will also be used with the year in the in-text citation as well:

> Survey results published in Theissen (2004a) show that…

➲ To **credit an author for discovering a work**, when you have not read the original:

Bergson's research (as cited in Mirković & Boškov, 2006)…

Here, Mirković & Boškov (2006) will appear in the reference list, while Bergson will not.

➲ When **citing more than one author**, the authors must be listed alphabetically:

(Britten, 2001; Sturlasson, 2002; Wasserwandt, 1997)

➲ When there is **no publication date**:

(Hessenberg, n.d.)

➲ **Page numbers must always be given for quotations**:

(Mirković & Boškov, 2006, p.12)

Mirković & Boškov (2006, p. 12) propose the approach by which "the initial viewpoint…

➲ **Referring to a specific part of a work**:

(Theissen, 2004a, chap. 3)

(Keaton, 1997, pp. 85-94)

➲ **Personal communications, including interviews, letters, memos, e-mails, and telephone conversations**, are cited as below. (These are *not* included in the reference list.)

(K. Ljubojević, personal communication, May 5, 2008).

FOOTNOTES AND ENDNOTES

A few footnotes may be necessary when elaborating on an issue raised in the text, adding something that is in indirect connection, or providing supplementary technical information. Footnotes and endnotes are numbered with superscript Arabic numerals at the end of the sentence, like this.[1] Endnotes begin on a separate page, after the end of the text. However, Strategic Management journal **does not recommend the use of footnotes or endnotes.**

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